Acknowledgements

The author wishes to express his appreciation to the associations, merchants, mills, cotton controllers, and others who participated in obtaining and forwarding the samples tested in this study.

He also thanks the U.S. Agricultural Attachés and the personnel of the Cotton Divisions of the Agricultural Marketing Service and the Foreign Agricultural Service who provided information, assisted in arrangements, and made the necessary tests.

FOREWORD

This report contains extensive information and data on quality comparisons of cotton produced and exported by many foreign countries with cotton grown in the United States. Exporters and others in the U.S. cotton industry have expressed a need for such information, recognizing that quality is an essential element in the marketing and manufacturing process.

U.S. cotton encounters strong competition from sharply increased production and exports abroad. Over 50 other countries of the world export cotton. These cottons have a wide range of quality characteristics because of differences in such factors as varieties, environmental conditions, and methods of cultivation, harvesting, and ginning. Therefore, quality comparisons in this publication can serve as an effective marketing tool for U.S. exporters. It also provides useful guides to cotton producers, breeders, and others interested in evaluation of different growths, types, or varieties of cotton having characteristics within certain defined limits.

This is the fourth, and by far the most comprehensive, of a series of quality comparison studies published by the Foreign Agricultural Service. Since the last report published in 1969, there have been changes in the relative importance of cotton from traditional and newer exporting countries, and in their varieties of cotton. An endeavor was made to obtain cotton samples for this study within a statistical framework that recognized volume changes among countries, as well as the importance, within each country of growth, varieties, region of origin, grade, and other pertinent factors.

Fiber and processing tests used, along with the traditional grade and staple length determinations, provide the most objective approach available today in evaluating cotton quality. These quality determinations, all made under the same set of standard conditions, are indicative of the contribution of several properties to overall spinning utility and market value of the cottons.

H. Reiter Webb Jr.
Director, Cotton Division

CONTENTS

THE WORLD'S COTTONS: a summary of cotton fiber and processing test results

By Robert B. Evans

SUMMARY AND CONCLUSIONS

This report, the fourth in a series comparing U.S. cotton and cotton of other growths as to fiber quality and spinning performance[1], presents comprehensive data on several hundred samples from nearly all the major cotton producing countries of the world. The samples were collected in 1970 and early 1971 from cotton associations, merchants, co-ops, and others in both cotton importing and producing countries. All testing was performed at the Cotton Testing Laboratory of the Agricultural Marketing Service, U.S. Department of Agriculture in Clemson, S.C., using the same standards and tests as the Laboratory applies in its regular test program on U.S. cotton. As the basis for comparison with U.S. cotton, the data gathered from the 1970 crop are considered to be directly comparable.

Over the years the staple length of Upland-type cottons grown in the world has been gradually increasing and there is now a heavy concentration in the 1-1/16" and 1-3/32" staple length categories. Some of the varieties widely planted in the United States are also widely used in other countries or have been the basis from which present varieties were derived. Machine-picked cotton is no longer a monopoly of the United States, but is now also produced in Mexico, Central America, Colombia, Brazil, Greece, Israel, USSR, and perhaps other countries. In many of these countries, however, the marketing and processing problems associated with machine-picked cotton may be greater than in the United States.

The United States produces possibly the widest range of cotton qualities of any country in the world, and thus provides cotton suitable for a wide range of textile requirements. Results of the present study indicate that U.S. cottons in relation to cottons grown elsewhere in the same staple length grouping are typically characterized by relatively low nonlint content and picker and card waste percentages.

Other characteristics of U.S. cotton are good Micronaire readings, which leads to good yarn appearance grades, and relatively high fiber strength, which contributes greatly to high yarn and fabric strength. Some U.S. samples, particularly those in the very short staple class, have yarn imperfection counts that are above average, but many of the handpicked samples from other countries had counts just as high or higher. It is difficult to make generalizations on cotton quality, however, because of the wide range of qualities both in the United States and elsewhere in the world. And cotton that would not be suitable for one use might be eminently suitable for another. The reader is therefore invited to study detailed data in the individual sections and to reach his own conclusions.

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[1] R. T. Baggett and T. L. W. Bailey, Jr., "Comparisons of Some Fiber and Spinning Test Results of Egyptian and American-Egyptian Cottons," Foreign Agriculture Circular, FC 7-56, U.S. Department of Agriculture, Washington, D.C., Oct. 17, 1956.

T. L. W. Bailey, Jr., and R. T. Baggett, "Foreign and United States Upland Cotton--Quality Comparisons and Evaluations, 1955 Crop," FAS-M14, Foreign Agricultural Service, U.S. Department of Agriculture, Washington 25 D.C., April 1957.

T. L. W. Bailey, Jr., and Robert B. Evans, "A Comparison of the Quality of Foreign and United States Upland Cottons as Indicated by Fiber and Spinning Tests," Foreign Agriculture Circular FC 8-69, USDA, May 1969.

INTRODUCTION

About 36 percent of the U.S. cotton crop was exported in 1970-71 and 32 percent in 1971-72. Export markets provide a very substantial demand for U.S. cotton that is vital to the economic utilization of the United States' cotton producing facilities. In the import markets of Western Europe, the Far East, and elsewhere, however, American cotton meets intense competition from cotton produced in other countries both as to price and quality.

Information on cotton prices in import markets is fairly readily available. There is little published information, however, indicating how the various growths compare in quality.

Cotton must be one of the most difficult of all commodities to characterize in terms of quality. Each bale contains billions of individual fibers, none precisely alike in length, diameter, color, strength, and other characteristics. And cotton that might be entirely suitable for one mill's product may not be at all good for another.

Over the years laboratory instruments and machines have been developed that give accurate measurements of many of the technical properties of raw cotton. Such data provide a more comprehensive and objective basis for appraising the quality of cotton than the traditional hand-classing method. The latter, of course, is inexpensive and gives good approximations as to cotton quality, particularly if information is available on the source of the cotton and the variety.

Raw cotton is, of course, a raw material. It is spun into yarn which is woven or knitted into fabric which is cut and sewn into clothing or other end products. The value of cotton as a raw material depends on the utility it imparts to the end product. Since the fabric and end product depend on the yarn, the ultimate test of cotton quality is first, how good a yarn can be made of it as to strength, appearance, lack of imperfections, etc.; second, how much waste is lost in processing the cotton into yarn; and third how fast it can be processed without breaks or ends down.

In the present study, the first step was determining statistically the quantity of cotton produced and exported in each of the principal producing countries. Second, wherever a country had an official grading system, an effort was made to determine the principal grades of cotton of that country from the viewpoint of their importance in world trade. If such information was not available, the leading descriptions of cotton were determined from trade information. Data also were obtained on varieties, whether the cotton was grown under irrigated or rain-grown conditions, whether saw-ginned or roller-ginned, and whether machine picked or handpicked.

Then samples were obtained of specified leading qualities of the various growths from two principal sources:

First the cotton associations in several importing countries including the Liverpool Cotton Association, the Association Francaise Cotonniere, the Bremer Baumwollborse, the East India Cotton Association, the Japan Cotton Traders Association, and the Hong Kong Spinners Association.

Second, the cotton associations and merchants of many of the cotton producing countries.

In all, approximately 500 samples were involved in this project. Each sample usually consisted of 5 pounds of cotton, but samples were usually in multiples of two of each description so that combined 10-pound samples of a specific description were usually available for spinning tests. The samples generally represent cotton obtained in 1970.

All of the cotton samples were shipped to the Cotton Laboratory of the Agricultural Marketing Service, USDA, at Clemson, S.C., where they were given the same fiber and spinning tests under the same conditions as samples of U.S. cotton in the AMS annual quality survey. The data thus are comparable with results of tests on U.S. cotton as given in "Summary of Cotton Fiber and Processing Test Results, Crop of 1970," published by AMS in April 1971, and similar publications for other years.

The author is fully aware that even though this report may present results of the most comprehensive test program conducted on the world's cottons, the number of samples involved in almost all cases is far short of what would be required for statistically valid conclusions. Also, cotton quality varies from year to year with the weather, so results presented may not be precisely applicable to another year's production. Nevertheless, it is believed that the present summary will provide valuable qualitative data that will be useful to those concerned with growing, marketing and processing cotton.

A detailed discussion of the methods of making tests and the significance of results is given in the appendix. Following is a brief summary.

Fiber test procedures

Fiber length data were obtained by the Digital Fibrograph method except for extra-long staple samples, for which the array method was used. The Digital Fibrograph 2.5-percent span length value indicates the length which will be spanned by 2.5 percent of the fibers when they are parallel and randomly distributed. Such values are closely related to staple length.

The *fiber length uniformity* percentage gives the ratio between the 50-percent span length and the 2.5-percent span length. The higher the percentage the more uniform the cotton. For U.S. Upland lots tested from the crops of 1966-68, the following adjective descriptions have been applied in reports on U.S. cotton:

50/2.5 uniformity ratio

Above 47	Very high
46-47	High
44-45	Average
42-43	Low
Below 42	Very low

Extra-long staple samples were given array tests on the Suter-Webb fiber sorter. The array upper quartile length values indicate the length which is exceeded by 25 percent of the weight of the fibers in the samples. This measurement is closely related to the Fibrograph length but is longer than both this and the classer's staple length.

Micronaire readings, a measure of cotton fineness, are obtained by air-flow instruments which measure the resistance of a plug of cotton of standard weight to a known air pressure. The Micronaire reading is now a part of the official standards for Upland cotton just as grade and staple length is. Low Micronaire values indicate immature fibers that are susceptible to the formation of neps and imperfections which results in lower yarn appearance grades. In the United States, 3.5 - 4.9 is the no-discount range for Micronaire readings on Upland cottons. The discount cotton for low Micronaire range from 3.4 to 2.6 and below. The discount increases as the Micronaire readings become lower.

Fiber strength data were obtained by use of (1) the Pressley flat bundle tester at 0 gage, or with no space between the jaws, and (2) the Stelometer with a 1/8" space between the clamp jaws. The 1/8"-gage measurement has a higher correlation with yarn strength. The Stelometer also measures *fiber elongation,* i.e., the extent to which the fiber may be stretched before breaking expressed as a percentage of the staple length.

Nonlint content was determined by the Shirley Analyzer.

Color measurements of grayness and yellowness were made with the Nickerson-Hunter Colorimeter. Grayness ranges from 0 for the brightest samples (no gray) through 9 for the darkest color. The yellowness scale ranges from 0 for no yellow to 9 for the yellowest color. Thus, the higher the number the darker or yellower the cotton. The composite index is related to market value and grade. For instance, 100 would be the color equivalent of Middling White in the U.S. Universal Standards, 104 to Strict Middling White, 85 to Low Middling White, 80 to Low Middling Light Spotted.

Spinning test procedures

Picker and card waste percentages need no explanation but obviously the less the waste, the greater the quantity of end product derived from a pound of raw cotton and the more valuable the cotton.

Yarn strength is perhaps the most important and reliable test of yarn quality. Figures given are for skein strength.

Yarn appearance refers to smoothness, evenness, and freedom from foreign material of yarn as evaluated by a visual comparison of yarn with standards adopted by the American Society for Testing and Materials. Yarn appearance grades relate to the indexes as follows:

Grade	*Index*
A	130
B+	120
B	110
C+	100
C	90
D+	80
D	70
Below D	60

Yarn imperfections were determined on "Neptel" instruments which electronically count the abrupt changes in the silhouette of the yarn while passing it through a beam of light. The changes are expressed as the number of imperfections per 50 yards of yarn as based on an average of 10 determinations.

U.S. classer's descriptions

Samples of cotton collected for this study were also classed in accordance with official U.S. Cotton Standards for grade and staple length by official cotton classers of the Department of Agriculture in Memphis, Tenn.

Comments on presentation

Results on tests of samples from each cotton growing country are presented in a separate section because of the voluminous amount of data.

In most cases, data are presented in ranges: that is, the lowest and highest values for each measure of quality. For instance, 4.2 - 4.7 for Micronaire for six samples of a given quality of a particular country indicates that Micronaire readings for the six samples fell within the 4.2 - 4.7 range. If a figure is preceded and followed by a dash, as - 4.4 - it indicates that all samples had this value.

In nearly all the tables, after presenting fiber and spinning test data for the various qualities of cotton of a given country, similar data are given for a reference quality or qualities produced in the United States during 1970-71. The U.S. quality may or may not resemble the cotton from the other country. In almost all instances it was impossible to find an exact match in all particulars. The U.S. quality is given only as a benchmark that is familiar to those working with U.S. cotton to assist in making comparisons.

Table 1.—Average fiber and spinning test results on samples of principal varieties of leading growths of cotton produced in the world, based on samples collected in 1970-71

Item	United States[1]				Mexico	Nicaragua
	Southeast	South Central	Southwest	West		
Production.....1,000 bales (480 lb. net)	1,176	3,818	3,402	1,796	1,440	345
Exports.....1,000 bales (480 lb. net)	6	606	2,240	1,045	760	357
Principal quality	SLM Wh. 1-1/16"	SLM Wh. 1-1/16"	M Lt. Spot 15/16"	M Wh. 1-3/32"	Sin-Son-Mid 1-1/16"	Type BS Mid Lt. Spot
Number of samples	(1)	(1)	(1)	(1)	5	4
Fiber test results:						
Fiber length:						
2.5 percent span .....inches	1.07	1.08	.92	1.10	1.09	1.06
Uniformity, 50/2.5 .....percent	45	45	46	45	42	45
Micronaire .....reading	4.5	4.5	4.5	4.2	4.4	4.5
Fiber strength:						
Zero gage.....Mpsi	83	82	85	94	85	74
1/8 inch gage., gm/tex	23.3	22.1	20.7	25.1	22.0	20.6
Nonlint content..percent	3.2	2.8	2.8	2.3	2.3	3.0
Color, raw cotton:						
Grayness .....number	2	2	2	1	1	2
Yellowness ...number	3	3	4	3	3	4
Composite .... index	98	97	98	102	104	100
Spinning test results:						
Picker & card waste .....percent	6.4	5.8	5.9	5.0	6.9	6.5
Carded yarn:						
Strength:						
22s.....pounds	104	101	90	120	100	94
50s.....pounds	35	34	(85-301)	44	33	31
Appearance:						
22s.....index	102	109	116	114	108	118
50s.....index	84	86	(85-121)	86	80	90
Imperfections:						
22s.....number	16	19	27	25	14	11
50s.....number	13	15	(85-44)	18	12	18
U.S. classer's grade .....percent of samples						
White, Strict Mid	(2)	(2)	(3)	(4)	--	--
White Middling.....	(2)	(2)	(3)	(4)	40	--
White St. Low Mid.....	(2)	(2)	(3)	(4)	--	25
White Other.....	(2)	(2)	(3)	(4)	--	--
Lt. Spot Strict Mid	(2)	(2)	(3)	(4)	40	--
Lt. Spot Middling	(2)	(2)	(3)	(4)	20	75
Lt. Spot Strict Low Mid	(2)	(2)	(3)	(4)	--	--
Lt. Spot Other.....	(2)	(2)	(3)	(4)	--	--
Other.....	(2)	(2)	(3)	(4)	--	--
U.S. classer's staple length .....percent of samples						
Below 31/32"..... 31/32"..... 1"..... 1-1/32"..... 1-1/16"..... 1-3/32"..... 1-1/8"..... Over 1-1/8".....	(See above)	(See above)	(See above)	(See above)	-- -- -- -- 20 60 20 --	-- -- -- -- 75 25 -- --

[1] Results from AMS report "Summary of Cotton Fiber and Processing Test Results, Crop of 1970". [2] Test results apply only to samples classed as SLM Wh. 1-1/16". [3] Test results apply only to samples classed as M Lt. Spot 15/16". [4] Test results apply only to samples classed as M Wh. 1-3/32".

Table 1.–Average fiber and spinning test results on samples of principal varieties of leading growths of cotton produced in the world, based on samples collected in 1970-71–Continued

Item	El Salvador	Guatemala	South Brazil[5]	Colombia	Peru	Greece
Production.....1,000 bales (480 lb. net)	250	250	1,860	540	380	505
Exports.....1,000 bales (480 lb. net)	223	220	[6] 1,011	175	260	328
Principal quality	Cl-Anna (Middling)	G-4 (Middling)	Type 6	SLM 1-1/16"	Tanguis Grade 2-1/2"	SM 1-3/32"
Number of samples	6	4	26	4	6	8
Fiber test results:						
Fiber length:						
2.5 percent span .....inches	1.10	1.11	1.05	1.10	1.24	1.12
Uniformity, 50/2.5 .....percent	47	44	44	48	47	47
Micronaire .....reading	4.6	4.6	3.8	4.8	5.4	4.1
Fiber strength:						
Zero gage.....Mpsi	76	82	81	78	86	88
1/8 inch gage..gm/tex	21.9	22.1	20.7	23.0	26.9	24.7
Nonlint content..percent	2.6	1.8	6.5	5.4	1.6	2.7
Color, raw cotton:						
Grayness.....number	1	1	3	2	0	1
Yellowness.....number	5	3	4	3	4	4
Composite..... index	104	104	94	100	106	104
Spinning test results:						
Picker & card waste .....percent	7.2	6.0	9.6	8.6	6.6	6.0
Carded yarn:						
Strength:						
22s..... pounds	103	100	94	110	119	129
50s.....pounds	35	35	31	40	38	47
Appearance:						
22s.....index	110	100	94	112	130	129
50s.....index	93	80	78	95	108	111
Imperfections:						
22s.....number	16	18	28	17	2	8
50s.....number	15	15	23	12	2	8
U.S. classer's grade .....percent of samples						
White, Strict Mid	17	--	--	--	80	--
White Middling.....	50	100	--	--	20	100
White St. Low Mid.....	--	--	--	75	--	--
White Other.....	--	--	--	25 LM	--	--
Lt. Spot Strict Mid.....	33	--	--	--	--	--
Lt. Spot Middling.....	--	--	4	--	--	--
Lt. Spot Strict Low Mid.....	--	--	42	--	--	--
Lt. Spot Other.....	--	--	12 LM	--	--	--
Other	--	--	42 SLM Spot	--	--	--
U.S. classer's staple length .....percent of samples						
Below 31/32".....	--	--	--	--	--	--
31/32".....	--	--	--	--	--	--
1"	--	--	--	--	--	--
1-1/32".....	--	--	38	--	--	--
1-1/16".....	--	100	27	25	--	--
1-3/32".....	50	--	19	50	--	17
1-1/8".....	50	--	12	25	80 (1-3/16")	83
Over 1-1/8".....	--	--	4 (1-5/32")	--	20 (1-1/4")	--

[5] Samples from North Brazil were insufficient to include here. [6] Total Brazil.

Table 1.–Average fiber and spinning test results on samples of principal varieties of leading growths of cotton produced in the world, based on samples collected in 1970-71–Continued

Item	Egypt	Franc Zone Africa	Nigeria	Sudan	Tanzania	Uganda
Production.....1,000 bales (480 lb. net)	2,335	750	180	1,156	290	350
Exports .....1,000 bales (480 lb. net)	1,450	635	191	1,049	286	313
Principal quality.....	Menoufi FG	Chad BJA 1st quality	NAIB	G6L	AR Mwanzas 1-1/16"	AR BPA
Number of samples.....	5	6	--	4	11	4
Fiber test results:						
Fiber length:						
2.5 percent span .....inches	1.33	1.13	1.01	1.28	1.08	1.16
Uniformity, 50/2.5 .....percent	47	48	43	43	45	46
Micronaire .....reading	3.7	4.5	3.4	4.0	3.8	3.7
Fiber strength:						
Zero gage.....Mpsi	101	82	93	103	84	87
1/8 inch gage..gm/tex	34.6	23.6	20.9	30.4	21.2	23.0
Nonlint content..percent	2.4	2.9	4.4	6.0	3.4	2.0
Color, raw cotton:						
Grayness .....number	4	1	1	5	2	1
Yellowness...number	6	4	5	7	4	3
Composite.....index	90	101	102	80	101	103
Spinning test results:						
Picker & card waste .....percent	8.4	7.8	4.6	11.5	6.9	7.5
Carded yarn:						
Strength:						
22s.....pounds	--	118	108	--	114	133
50s.....pounds	71 combed	41	35	56 combed	40	49
Appearance:						
22s.....index	--	110	119	--	114	120
50s.....index	118 combed	120	92	115 combed	94	100
Imperfections:						
22s.....number	--	10	7	--	13	12
50s.....number	2 combed	9	9	2 combed	12	10
U.S. classer's grade .....percent of samples						
White, Strict Mid	(Pima Grade 2-40% Grade 3-60%)	--	12	(Pima Grade 5 100%)	--	--
White Middling.....	--	--	--	--	--	--
White St. Low Mid.....	--	--	--	--	--	--
White Other.....	--	--	--	--	--	--
Lt. Spot Strict Mid.....	--	--	88	--	40	--
Lt. Spot Middling.....	--	100	--	--	60	100
Lt. Spot Strict Low Mid.....	--	--	--	--	--	--
Lt. Spot Other.....	--	--	--	--	--	--
Other.....	--	--	--	--	--	--
U.S. classer's staple length .....percent of samples						
Below 31/32"	--	--	--	--	--	--
31/32".....	--	--	--	--	--	--
1"	--	--	62	--	--	--
1-1/32".....	--	--	13	--	--	--
1-1/16".....	--	--	13	--	40	--
1-3/32".....	--	100	12	--	60	--
1-1/8".....	1-3/8"-60	--	--	1-3/8"-100%	--	1-5/32"-50
Over 1-1/8".....	1-7/16"-40	--	--	--	--	1-3/16"-50

Table 1.—Average fiber and spinning test results on samples of principal varieties of leading growths of cotton produced in the world, based on samples collected in 1970-71—Continued

Item	USSR	India	Iran	Pakistan	Syria	[illegible]
Production . . . . . 1,000 bales (480 lb. net)	10,800	4,650	707	2,500	685	1,9[illegible]
Exports . . . . . 1,000 bales (480 lb. net)	2,500	137	494	473	615	1,07[illegible]
Principal quality	Pervyi 1 31/32 mm.	L 147	[7] SM 1-1/16"	AC 134 SG	[8] Type O/X 1-3/32"	[9] St. 1 [illegible]
Number of samples	12	4	5	--	3	[illegible]
Fiber test results:						
Fiber length: 2.5 percent span . . . . . inches	1.05	1.06	1.06	.99	1.11	1.[illegible]
Uniformity, 50/2.5 . . . . . percent	48	45	46	46	46	[illegible]
Micronaire . . . . . reading	4.8	4.3	4.0	4.6	4.1	[illegible]
Fiber strength:						
Zero gage . . . . . Mpsi	79	94	79	96	81	[illegible]
1/8 inch gage . . gm/tex	23.0	22.8	23.0	24.7	22.4	22.[illegible]
Nonlint content . . percent	4.1	6.9	5.0	8.6	3.7	[illegible]
Color, raw cotton:						
Grayness . . . . . number	0	2	2	3	1	[illegible]
Yellowness . . . . number	4	4	4	4	4	[illegible]
Composite . . . . . index	105	98	96	96	104	10[illegible]
Spinning test results:						
Picker & card waste . . . . . percent	5.6	12.4	8.9	11.0	8.0	10.[illegible]
Carded yarn:						
Strength:						
22s . . . . . pounds	110	97	108	109	114	10[illegible]
50s . . . . . pounds	39	32	38	37	40	3[illegible]
Appearance:						
22s . . . . . index	111	90	106	109	120	10[illegible]
50s . . . . . index	92	72	88	82	97	8[illegible]
Imperfections:						
22s . . . . . number	18	33	23	16	14	17
50s . . . . . number	13	28	17	22	12	1[illegible]
U.S. classer's grade . . . . . percent of samples						
White, Strict Mid	--	--	--	--	33	--
White Middling	83	--	20	--	67	2[illegible]
White St. Low Mid	--	--	40	--	--	2[illegible]
White Other	--	--	--	--	--	2[illegible]
Lt. Spot Strict Mid.	--	--	--	--	--	[illegible]
Lt. Spot Middling	17	--	--	--	--	--
Lt. Spot Strict Low Mid	--	50	20	18	--	12.[illegible]
Lt. Spot Other	--	50 LM Lt. Spot	20 Mid. Spot	82 LM Lt Spot	--	12.[illegible]
Other	--	--	--	--	--	--
U.S. classer's staple length . . . . . percent of samples						
Below 31/32"	--	--	--	--	--	--
31/32"	--	--	--	--	--	--
1"	--	--	--	45	--	20
1-1/32"	--	50	--	55	--	10
1-1/16"	75	25	40	--	--	20
1-3/32"	25	--	40	--	33	10
1-1/8"	--	--	20	--	67	40
Over 1-1/8"	--	25 15/32"	--	--	--	--

[7] Includes one sample 1-3/32." [8] For two samples of 0 1-1/8" and one of 0 1-1/16". [9] Including four saw-ginned and four roller-ginned samples.

RESULTS BY COUNTRY

LATIN AMERICA

Mexico

Mexico is one of the leading cotton producing countries of the world but production declined sharply from a peak of 2.6 million bales in 1955-56 to only 1.4 million bales in 1970-71, rising to 1.7 million in 1971-72. Exports in 1970-71 are estimated to have totaled only 760,000 bales compared to 1,227,000 bales in 1969-70 and 1,623,000 bales in 1968-69, but may total 1,000,000 bales in 1971-72.

Table 2.—Production of cotton in Mexico, 1969-72

Region	1969-70	1970-71	1971-72
	1,000 bales[1]	*1,000 bales*[1]	*1,000 bales*[1]
Sinaloa-Sonora	744	653	698
Mexicali	201	157	127
Laguna	363	290	435
Apatzingen	114	78	117
Tapachula	63	62	97
Juarez	40	32	57
Others	196	139	181
Total	1,721	1,411	1,712

[1] 480 lb. net.

Sinaloa-Sonora is the leading cotton producing region of Mexico. About 90 percent of the cotton produced in this region on the West Coast, as well as in the Mexicali area and around La Paz in Baja California, is exported. The Tapachula area exports about 10 percent, Apatzingen around 30 percent, and Laguna 30 percent.

Nearly all of Mexico's cotton is of the DPL Upland variety. DPL Smoothleaf is being replaced by DPL 16. Exceptions are 100 percent of the cotton in the Juarez area—across the border from El Paso, Texas—and 5 percent of the cotton in the Laguna area, both of which are of the Acala 1517 Upland variety.

All of Mexico's cotton is handpicked except roughly 75,000 bales, which is machine picked, largely in the Caborca area of the West Coast. Cotton is harvested over an 8-month period beginning in late June on the West Coast and ending in February or even March in Apatzingen and Tapachula in south central and southern Mexico. All of Mexico's cotton is saw-ginned.

Mexico has no national cotton classification service but according to trade estimates the crop usually analyses as to grades and staple lengths about as follows:

Staple length

All regions but Juarez

Inches	*Percent*
1-1/32 or less	5
1-1/16	80
1-3/32	15
Total	100

Juarez

Inches	*Percent*
1-1/8	20
1-5/32	20
1-3/16	50
1-7/32	10
Total	100

Grade

All regions

	Percent
Middling or better	60
Strict Low Middling	25
Below Strict Low Middling	15
Total	100

The quality of export cotton is said to be about the same as the cotton consumed domestically. An exception is that the Juarez area exports the highest grade.

Results of tests on 35 samples of Mexican cotton indicate that fiber and spinning characteristics of the cotton resemble Arizona, Mississippi, and other similar U.S. cottons in the 1-1/16" and 1-3/32" staple lengths and Middling and Strict Low Middling grades. Samples from Laguna with a Micronaire of 3.8 to 4.0, however, were more comparable to Strict Low Middling 1-1/16", 3.8-4.2 Micronaire cotton from Texas. U.S. classers found staple lengths to be as long as or longer than trade descriptions of Mexican cotton in both Mexico and Japan. As for grades, U.S. classers rated many of the samples both above and below trade descriptions.

Table 3.—Average of fiber and spinning test results on samples of specified Mexican and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Trade description, number of samples, where obtained						
	Acala 1517 Middling 1-5/32" 1 sample from Mexico	Middling 1-3/32" 2 samples from import market	Strict Middling 1-1/16" 3 samples from Mexico	Middling 1-1/16" 6 samples from Mexico	Middling 1-1/16" 11 samples from import market	SLM 1-1/16" 6 samples from Mexico	SLM 1-1/16" 6 samples from Osaka
Fiber test results:							
Fiber length:							
2.5 percent span . . . . . inches	1.21	1.10	1.07	1.08	1.09	1.09	1.09
Uniformity, 50/2.5 . . . . percent	46	46	44	44	44	45	44
Micronaire . . . . . reading	4.0	4.6	4.8	4.1	4.4	4.5	4.3
Fiber strength:							
Zero gage . . . . . Mpsi	92	86	92	79	84	84	88
1/8 inch gage . . . . . gm/tex	26.6	23.2	23.9	20.8	22.5	22.1	23.1
Elongation:							
1/8 inch . . . . . percent	6.2	7.1	5.8	7.1	7.0	6.7	6.2
Nonlint content . . . . . percent	2.1	2.0	2.5	2.6	1.9	2.8	2.2
Color, raw cotton:							
Grayness . . . . . number	1	0	1	1	0	1	1
Yellowness . . . . . number	3	4	3	3	4	3	4
Composite . . . . . index	102	106	102	103	105	101	103
Spinning test results:							
Picker & card waste . . . percent	7.6	6.2	7.3	5.9	6.0	7.0	6.5
Carded yarn:							
Strength:							
22s . . . . . pounds	142	112	103	103	105	104	105
50s. . . . . pounds	55	39	34	36	36	32	35
Elongation:							
22s. . . . . percent	6.6	6.7	6.1	7.2	6.8	6.8	6.5
50s. . . . . percent	5.4	5.5	4.4	5.4	5.4	5.2	5.1
Appearance:							
22s. . . . . index	90	110	110	105	109	107	102
50s. . . . . index	80	80	73	72	88	87	83
Imperfections:							
22s. . . . . number	20	13	19	19	15	16	20
50s. . . . . number	16	12	14	15	13	15	19
U.S. classer's grade . . . . . percent of samples							
SM White	--	50	--	--	46	--	17
M White	100	--	--	--	27	--	33
SLM White	--	--	--	33	--	83	17
SM Light Spot	--	50	--	--	27	--	33
M Light Spot	--	--	100	67	--	--	--
M Spot	--	--	--	--	--	17	--
U.S. classer's staple length . . . . . percent of samples							
1-1/32"	--	--	--	--	--	--	--
1-1/16"	--	--	33	33	27	17	33
1-3/32"	--	100	67	67	55	83	33
1-1/4"	--	--	--	--	18	--	17
1-5/32"	--	--	--	--	--	--	17
1-3/16"	100	--	--	--	--	--	--

Table 4.--Mexico: Quality characteristics of Sinaloa-Sonora cotton

Item	Trade description, number of samples, where obtained					U.S. reference qualities	
	Middling 1-3/32" 2 samples from import market	Middling 1-1/16" 1 sample from Torreon	Middling 1-1/16" 4 samples from import market	SLM 1-1/16" 3 samples from Torreon	SLM 1-1/16" 1 sample from import market	Arizona DPL M 1-1/16" All 160 samples	Miss. SLM 1-3/32" All 280 samples
Fiber test results:							
Fiber length:							
2.5 percent span . . . . . inches	-1.10-	1.07	1.07-1.11	1.08-1.10	1.08	1.08-1.13	1.07-1.14
Uniformity, 50/2.5 . . . . percent	-46-	44	41-42	44-46	45	40-45	41-46
Micronaire . . . . . reading	4.6	4.4	4.2-4.9	4.2-5.0	5.1	4.2-5.0	3.9-4.9
Fiber strength:							
Zero gage . . . . . Mpsi	86	84	84-88	83-90	90	83-87	78-87
1/8 inch gage . . . . . gm/tex	22.9-23.6	22.3	21.0-22.3	20.7-23.5	23.8	21.9-24.1	22.1-24.8
Elongation:							
1/8 inch . . . . . percent	6.7-7.5	6.7	6.2-6.8	6.2-7.1	6.2	6.3-7.5	5.4-7.0
Nonlint content . . . . . percent	2.0-2.1	2.5	2.0-2.3	2.6-3.2	2.4	2.4-3.2	2.6-3.8
Color, raw cotton:							
Grayness . . . . . number	-0-	1	0-1	1	0	1-2	1-3
Yellowness . . . . . number	-4-	3	3	3	4	-3-	1-3
Composite . . . . . index	-106-	103	102-107	102-104	105	101-103	95-102
Spinning test results:							
Picker & card waste . . . . . percent	5.6-6.6	5.6	6.0-10.4	5.6-7.2	6.5	5.0-6.2	5.5-7.1
Carded yarn:							
Strength:							
22s. . . . . pounds	-112-	105	90-105	101-105	96	98-110	102-112
50s. . . . . pounds	-39-	36	28-36	31-36	31	31-39	32-39
Elongation:							
22s . . . . . percent	6.5-6.9	7.2	6.0-7.2	5.9-7.4	5.8	5.5-6.6	6.3-7.7
50s. . . . . percent	5.3-5.7	5.7	4.5-5.3	4.7-5.4	4.5	3.9-4.7	4.8-6.0
Appearance:							
22s. . . . . index	100-120	110	100-110	90-110	100	110-130	90-110
50s. . . . . index	70-90	70	70-90	80-90	90	-90-	70-90
Imperfections:							
22s. . . . . number	7-19	12	11-17	12-17	15	17-29	11-24
50s. . . . . number	8-16	12	8-15	12-13	17	13-31	9-24
U.S. classer's grade . . . . . percent of samples							
SM White	50	--	--	--	--	(See title)	(See title)
M White	--	--	50	--	100		
SLM White	--	--	--	100	--	--	--
SM Light Spot	50	--	50	--	--	--	--
M Light Spot	--	100	--	--	--	--	--
U.S. classer's staple length . . . . . percent of samples							
1-1/16"	--	100	--	33	--	--	--
1-3/32"	100	--	75	67	100	--	--
1-1/4"	--	--	25	--	--	--	--

Table 5.–Mexico: Quality characteristics of samples of Juarez and Laguna cotton

Item	Mexico Juarez Acala 1517 Middling 1-5/32" 1 sample from Juarez	U.S. comparison: Acala 1517 M White All samples All 175 samples	Mexico Middling 1-1/16" 4 samples from Mexico	Laguna SLM 1-1/16" 1 sample from Mexico	U.S. reference quality: Texas SLM White 1-1/16" 3.8-4.2 Micronaire All 225 samples
Fiber test results:					
Fiber length:					
2.5 percent span . . . . inches	1.21	1.15-1.21	1.07-1.09	1.09	1.04-1.13
Uniformity, 50/2.5 . . percent	46	44-47	42-44	44	43-47
Micronaire . . . . . reading	4.0	3.4-4.1	3.8-4.0	3.8	3.8-4.2
Fiber strength:					
Zero gage . . . . . Mpsi	92	90-98	75-79	76	84-93
1/8 inch gage . . . . . gm/tex	26.6	26.1-27.9	20.3-21.7	21.8	21.9-25.1
Elongation:					
1/8 inch . . . . . percent	6.2	4.8-5.7	6.9-7.9	8.0	5.7-7.2
Nonlint content . . . . . percent	2.1	1.9-3.8	2.4-3.0	2.4	2.1-3.2
Color, raw cotton:					
Grayness . . . . . number	1	0-1	- 1 -	2	2-3
Yellowness . . . . . number	3	2-3	3-4	5	2-4
Composite . . . . . index	102	102-106	102-103	98	95-100
Spinning test results:					
Picker & card waste . . . . percent	7.6	6.7-8.4	5.2-7.0	9.3	4.7-6.1
Carded yarn:					
Strength:					
22s. . . . . pounds	142	129-145	104-105	111	106-124
50s. . . . . pounds	55	48-55	37	25	39-45
Elongation:					
22s. . . . . percent	6.6	6.4-7.3	6.9-7.7	8.0	5.7-6.6
50s. . . . . percent	5.4	5.3-6.1	4.9-6.0	6.2	4.2-4.8
Appearance:					
22s. . . . . index	90	70-110	- 100 -	120	100-120
50s. . . . . index	80	60-90	- 70 -	90	80-100
Imperfections:					
22s. . . . . number	20	12-30	21-22	11	14-39
50s. . . . . number	16	10-23	16-18	14	11-35
U.S. classer's grade . . . . percent of samples					
M White	100	(See	--	--	(See
SLM White	--	title)	25	--	title)
M Light Spot	--		75	--	
M Spot	--		--	100	
U.S. classer's staple length . . . . . percent of samples					
1-1/16"	--	--	25	--	--
1-3/32"	--	--	75	100	--
1-1/4"	--	--	--	--	--
1-5/32"	100	87	--	--	--
1-3/8"	--	13	--	--	--

Table 6.—Mexico: Quality characteristics of Mexicali cotton

Item	Trade description, number of samples, where obtained				U.S. reference qualities	
	SM 1-1/16" 3 samples from Mexicali	M 1-1/16" 4 samples from import market	SLM 1-1/16" 1 sample from Mexicali	SLM 1-1/16" 2 samples from import market	Arizona DPL M 1-1/16" All samples 160	Ariz.-Imp Valley DPL SLM 1-1/16" All samp. 80
Fiber test results:						
Fiber length:						
2.5 percent span . . . . . inches	1.06-1.09	1.04-1.14	1.11	1.02-1.13	1.08-1.13	1.08-1.14
Uniformity, 50/2.5 . . . . percent	-44-	45-47	45	42-43	40-45	43-45
Micronaire . . . . . reading	4.8	4.4-4.9	4.8	3.3-39	4.2-5.0	3.9-4.7
Fiber strength:						
Zero gage . . . . . Mpsi	91-94	80-90	89	86-94	83-87	84-91
1/8 inch gage . . . . . gm/tex	23.3-24.5	21.9-24.8	23.5	22.3-24.3	21.9-24.1	22.7-25.3
Elongation:						
1/8 inch . . . . . percent	5.6-5.9	6.3-7.8	5.9	5.6-6.9	6.3-7.5	6.1-6.7
Nonlint content . . . . . percent	1.8-2.8	1.3-2.4	3.2	2.3-3.3	2.4-3.2	2.7-3.6
Color, raw cotton:						
Grayness . . . . . number	-1-	0-1	1	-1-	1-2	1-2
Yellowness . . . . . number	-3-	3-4	3	2-5	-3-	-2-
Composite . . . . . index	102-103	105-107	101	103	101-103	94-101
Spinning test results:						
Picker & card waste . . . . . percent	5.8-8.3	4.2-6.7	7.8	5.6-8.7	5.0-6.2	5.7-6.5
Carded yarn:						
Strength:						
22s. . . . . pounds	101-105	105-119	101	99-117	98-110	102-116
50s. . . . . pounds	33-36	39-42	34	29-42	31-39	34-41
Elongation:						
22s. . . . . percent	6.0-6.1	6.5-6.9	6.2	6.0-7.0	5.5-6.6	5.3-6.0
50s. . . . . percent	4.2-4.6	5.3-5.6	4.7	4.1-5.8	3.9-4.7	3.7-4.5
Appearance:						
22s. . . . . index	100-120	110-120	100	90-100	110-130	100-120
50s. . . . . index	70-80	90-100	80	70-80	-90-	70-90
Imperfections:						
22s. . . . . number	13-29	12-16	25	26-31	17-29	18-37
50s. . . . . number	9-18	11-14	26	20-35	13-31	18-28
U.S. classer's grade . . . . . percent of samples						
SM White	--	75	--	--	(See title)	(See title)
M White	--	25	--	--		
SLM White	--	--	100	50		
SM Light Spot	--	--	--	50		
M Light Spot	100	--	--	--		
U.S. classer's staple length . . . . . percent of samples						
1-1/32"	--	--	--	50		
1-1/16"	33	25	--	--		
1-3/32"	67	50	100	--		
1-1/4"	--	25	--	--		
1-5/32"	--	--	--	50		

Table 7.--Mexico: Quality characteristics of La Paz cotton

Item	Description, number of samples, where obtained				U.S. reference qualities	
	M 1-1/16" 1 sample from La Paz	M 1-1/16" 3 samples from import market	SLM 1-1/16" 1 sample from La Paz	SLM 1-1/16" 3 samples from import market	Arizona DPL Middling 1-1/16" All samp. 200	Miss. SLM 1-3/32" All samples 350
Fiber test results:						
Fiber length:						
2.5 percent span . . . . . inches	1.05	1.07-1.09	1.10	1.07-1.12	1.08-1.13	1.07-1.14
Uniformity, 50/2.5 . . . . percent	46	42-46	47	44-45	40-45	41-46
Micronaire . . . . . reading	4.9	3.8-4.7	4.9	4.2-4.7	4.2-5.0	3.9-4.9
Fiber strength:						
Zero gage . . . . . Mpsi	82	76-84	81	82-91	83-87	78-87
1/8 inch gage . . . . . gm/tex	20.4	21.4-23.5	20.9	22.4-23.0	21.9-24.1	22.1-24.8
Elongation:						
1/8 inch . . . . . percent	5.5	6.2-8.7	5.9	5.6-7.2	6.3-7.5	5.4-7.0
Nonlint content . . . . . percent	2.8	1.8-2.1	2.9	1.7-1.8	2.4-3.2	2.6-3.8
Color, raw cotton:						
Grayness . . . . . number	1	0-1	2	1-2	1-2	1-3
Yellowness . . . . . number	3	-4-	3	3-5	-3-	1-3
Composite . . . . . index	103	104-105	98	101-102	101-103	95-102
Spinning test results:						
Picker & card waste . . . . . percent	6.8	4.8-5.7	6.1	5.0-7.7	5.0-6.2	5.5-7.1
Carded yarn:						
Strength:						
22s. . . . . pounds	94	101-111	105	103-108	98-110	102-112
50s. . . . . pounds	30	35-38	35	35-38	31-39	32-39
Elongation:						
22s. . . . . percent	6.4	6.5-7.8	6.4	6.2-7.5	5.5-6.6	6.3-7.7
50s. . . . . percent	4.5	5.2-6.3	5.0	5.1-5.9	3.9-4.7	4.8-6.0
Appearance:						
22s . . . . . index	120	100-120	110	100-110	110-130	90-110
50s. . . . . index	80	80-100	100	80-90	-90-	70-90
Imperfections:						
22s. . . . . number	17	10-22	14	16-17	17-29	11-24
50s. . . . . number	12	9-22	12	12-15	13-21	9-24
U.S. classer's grade . . . . . percent of samples						
SM White	--	67	--	34	(See title)	(See title)
M White	--	--	--	33		
SLM White	100	--	100	--		
SM Light Spot	--	33	--	33		
U.S. classer's staple length . . . . . percent of samples						
1-1/16"	--	67	--	67		
1-3/32"	100	33	100	33		

El Salvador

El Salvador produced 310,000 bales in 1971-72 compared to 240,000 bales in 1970-71. Around 50,000 bales each season are consumed domestically and the remainder exported. The cotton is picked three or four times a season and the ginning season runs from about mid-November for 4 months or more.

All of El Salvador's cotton is rain-grown, handpicked, and saw-ginned.

Stoneville 213 has replaced Deltapine Smooth Leaf as El Salvador's leading variety:

Variety	1968-69	1969-70	1970-71
	Percent of acreage		
Deltapine Smooth Leaf	51	23	13
Stoneville 213	33	46	63
Stoneville 7A	([1])	22	16
Deltapine	([1])	4	2
Copal	([1])	3	5
Acala 1513 BR	13	([1])	([1])
Other	3	2	1
Total	100	100	100

[1] If any, included in "Other."

New seed is imported from the United States each year for multiplication and delivery to farmers. The Institut de Recherches du Coton et des Textiles Exotiques, with headquarters in Paris, is conducting a program to select and develop cotton varieties and improve cultural practices.

The Salvador Cotton Co-operative grades and markets the entire crop. According to the Co-op's statistics, 40 percent or more of the crop has been in the C-1 ANA or Middling grade and 30 percent or more of the crop in the C-2 SALVA or Middling Dull grade in each of the 1968, 1969, and 1970 crops. The

Table 8.—Production of cotton in El Salvador by grades, 1968-71

Type	International grade	Staple length	Crop year					
			1968-69	1969-70	1970-71	1968-69	1969 70	1970-71
		Inches	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*Percent*	*Percent*	*Percent*
A-SUPRA	Good Middling	1-3/32	–	.6	1.1	–	0.3	0.5
B-MAGNA	Strict Middling	1-3/32	4.2	8.3	14.8	2.1	4.2	6.1
C1-ANA	Middling	1-3/32	82.4	79.8	104.7	42.5	40.0	43.8
C2-SALVA	Middling Dull (off color)	1-3/32	70.5	67.4	74.6	36.4	33.8	31.1
D1-VERA	Middling Lt. Spotted	1-3/32	1.0	.9	1.7	.5	.5	.7
D2-SLBD	Middling Grays (off color)	1-3/32	26.1	25.6	30.5	13.4	12.8	12.6
D3-MART	Strict Low Middling Grays (off color)	1-3/32	8.1	12.5	9.7	4.1	6.2	4.0
E-LENA	Low Middling Spotted	1-1/16	.5	.8	.6	.2	.4	.2
F-FLOR	Good Ordinary to Strict Good Ordinary	1-1/16	.9	2.5	.7	.4	1.3	.3
G-CHRN	Below grades	1	.8	1.1	1.7	.4	.5	.7
	Total		194.5	199.5	240.1	100.0	100.0	100.0

Compiled from reports of Cooperativa Algodonera Salvadorena.
[1] Bales of 501 pounds net.

statistics indicate that the cotton is now largely 1-3/32". Pressley strengths are reported to range from 70,000 to 85,000 pounds per square inch while Micronaire readings average 4.0.

Fiber tests on 14 samples of El Salvador cotton indicated fiber lengths generally equivalent to 1-1/16" and 1-3/32" staple lengths. Some of the samples had very high uniformity ratios. Pressley strength ranged from 71,000 to 79,000 pounds per square inch which would be below strengths of most of the U.S. crop.

Table 9.—Minimum and maximum fiber and spinning test results on samples of specified El Saluadoran and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	MAGNA (St. Mid. 1-3/32") 2 samples from import market	ANA (Middling 1-3/32") 6 samples from import markets	SALVA (Mid. Dull 1-3/32") 4 samples from import markets	SLBD (Mid. Gray 1-3/32") 2 samples from import markets	Two U.S. reference qualities	
					Missouri SLM Lt Spot 1-1/16" All 100 samples	Southwest LM White 1-1/16" All 150 samples
Fiber test results:						
Fiber length:						
2.5 percent span . . . . . inches	-1.07-	1.07-1.12	1.05-1.11	-1.05-	1.05-1.08	1.07-1.10
Uniformity, 50/2.5 . . . . percent	47-48	44-49	46-48	45-46	45-46	45-46
Micronaire . . . . . reading	4.6-4.7	4.1-4.9	4.4-4.8	-4.4-	3.8-4.4	4.1-4.9
Fiber strength:						
Zero gage . . . . . Mpsi	71-73	74-78	74-79	74-75	75-82	78-87
1/8 inch gage . . . . . gm/tex	20.2-21.0	21.0-22.6	20.0-22.2	20.3-20.7	19.4-23.3	21.5-22.9
Elongation:						
1/8 inch . . . . . percent	6.9-7.5	6.7-7.5	6.4-7.1	6.8-7.0	6.3-7.2	5.5-6.6
Nonlint content . . . . . percent	-1.8-	2.2-3.0	2.6-2.9	3.0-3.1	2.9-3.8	3.9-4.1
Color, raw cotton:						
Grayness . . . . . number	-1-	0-1	1-2	-2-	-3-	3-4
Yellowness . . . . . number	-6-	4-6	4-5	-3-	3-4	2-3
Composite . . . . . index	-105-	103-105	101-103	96-99	91-94	88-95
Spinning test results:						
Picker & card waste . . . . . percent	-4.2-	5.5-8.2	6.0-7.9	6.4-7.1	5.8-6.8	6.0-7.1
Carded yarn:						
Strength:						
22s. . . . . pounds	-105-	101-108	98-101	96-97	91-105	95-106
50s. . . . . pounds	-37-	33-38	34-35	31-32	29-36	32-39
Elongation:						
22s. . . . . percent	-7.2-	6.6-7.2	6.6-6.9	6.6-7.0	5.5-6.2	5.4-6.0
50s. . . . . percent	-5.8-	5.3-5.9	5.3-5.9	5.2-5.4	3.7-4.6	3.9-4.7
Appearance:						
22s. . . . . index	-120-	100-120	110-120	-120-	110-120	110-120
50s. . . . . index	-90-	90-100	-90-	-90-	-90-	80-100
Imperfections:						
22s. . . . . number	-10-	12-21	15-16	10-12	20-34	17-37
50s. . . . . number	-9-	10-18	11-12	9-11	14-23	13-24
U.S. classer's grade . . . . . percent of samples						
St. Mid. White	--	17	--	--		
Mid. White	--	50	75	--	(See	(See
St. Low Mid. White	--	--	--	100	title)	title)
St. Mid. Lt Spot	--	33	--	--		
Mid. Lt. Spot.	--	--	25	--		
Good Mid. Spot	100	--	--	--		
U.S. classer's staple length . . . . . percent of samples						
1-1/16"	100	--	--	50	(See	(See
1-3/32"	--	50	50	50	title)	title)
1-1/8"	--	50	50			

Guatemala

Production of cotton in Guatemala totaled 280,000 bales in 1970-71 compared to 250,000 bales in 1969-70 and a peak of 410,000 bales in 1965-66. Consumption now totals around 40,000 bales and the bulk of the crop is exported.

Guatemala's cotton is harvested from early December through March. All of the cotton is rain-grown, handpicked, and saw-ginned, and is of the American Upland type including about 60 percent planted to Stoneville 7A and 40 percent to DPL Smoothleaf. New registered seed for planting a small part of the crop is imported each year from the United States. An attempt is made to not plant seed older than the second generation.

About two-thirds of the crop is reported to be 1-1/16" in staple length and most of the remainder is 1-3/32" except for small quantities of 1-1/32" cotton at the end of the season. According to the National grading system, around half of Guatemala's cotton is of the G-4 grade or Middling and another fourth to a third is of the G-5 or Strict Low Middling plus grade.

Table 10.—Production of cotton by grades in Guatemala, 1968-71

International grade	Guatemalan grade	1968-69	1969-70	1970-71
		Percent	*Percent*	*Percent*
Good Middling	G 1	(1)	1	1
Strict Middling	G 2	1	2	2
Middling Plus	G 3	9	16	16
Middling	G 4	50	48	49
Strict Low Middling Plus	G 5	35	23	23
Strict Low Middling	G 6	4	8	7
Low Middling	G 7	1	1	1
Lower grades	--	(1)	1	1
Total	--	100	100	100
		1,000 bales	*1,000 bales*	*1,000 bales*
Total	--	380	250	280

Based on statistics of Consejo Nacional del Algodon.
[1] Less than 0.5 percent.

Table 11.—Fiber and spinning test results on samples of specified Guatemalan and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Middling 1-1/16" 2 samples from import market	Strict Low Middling 1-1/16" 2 samples from import market	U.S. reference quality South Cent. SLM White 1-1/16" All 1650 samples average
Fiber test results:			
Fiber length:			
2.5 percent span . . . . . inches	1.09-1.13	1.09-1.11	1.08
Uniformity, 50/2.5 . . . . . percent	44-45	-44-	45
Micronaire . . . . . reading	4.4-4.5	4.6-4.7	4.5
Fiber strength:			
Zero gage . . . . . Mpsi	76-77	86-89	82
1/8 inch gage . . . . . gm/tex	21.6-22.1	-22.5-	22.1
Elongation:			
1/8 inch . . . . . percent	7.4-7.6	-5.2-	6.4
Nonlint content . . . . . percent	-1.7-	-1.9-	2.8
Color, raw cotton:			
Grayness . . . . . number	-1-	-1-	2
Yellowness . . . . . number	-3-	-3-	3
Composite . . . . . index	-104-	-104-	97
Spinning test results:			
Picker & card waste . . . . . percent	-5.4-	-6.5-	5.8
Carded yarn:			
Strength:			
22s. . . . . pounds	-101-	-99-	101
50s. . . . . pounds	-36-	-33-	34
Elongation:			
22s. . . . . percent	-6.9-	-5.8-	6.3
50s. . . . . percent	-5.6-	-4.5-	4.7
Appearance:			
22s. . . . . index	-110-	-90-	109
50s. . . . . index	-90-	-70-	86
Imperfections:			
22s. . . . . number	-18-	-17-	19
50s. . . . . number	-15-	-15-	15
U.S. classer's grade . . . . . percent of samples			
Middling White	100	100	(See title)
U.S. classer's staple length . . . . . percent of samples			
1-3/32"	100	100	(See title)

Nicaragua

Nicaragua is the largest producer of cotton in Central America but production declined from 530,000 bales in 1966-67 to about 345,000 bales in 1970-71, then rose to 450,000 bales in 1971-72. All but a few thousand bales are exported. The crop is picked from November through January. The gins begin to operate in late November and usually keep going until late April.

In 1969-70, 58 percent of Nicaragua's cotton acreage was planted to Deltapine Smooth Leaf, 31 percent to Stoneville 213, 8 percent to Stoneville 7A, and 3 percent to other varieties. Some seed is imported each year from the United States and some is saved from the local crop for planting. Research is being conducted to select and develop new varieties, especially varieties with greater fiber strength. Practically all of the Nicaraguan cotton crop is rain-grown. Between 15 and 20 percent is machine picked; the remainder is handpicked. All of the cotton in Nicaragua is saw-ginned.

According to statistics of the National Cotton Classing Office, one-third of Nicaragua's cotton is Type BS which is considered to be the equivalent of Middling Light Spotted. Type CP, Strict Low Middling Plus, accounted for another 20 percent and Type C or Strict Low Middling for another 19 percent.

Tests made by the National Cotton Classing Office on 11,664 samples of the 1970-71 crop gave an average Micronaire of 4.23 and an average Pressley strength of 72,400 pounds. Fiber tests on 21 samples of Nicaragua cotton indicated that most samples had a fiber length equivalent to U.S. 1-1/16" cotton with a few samples equivalent to 1-1/32" and some to 1-3/32". Micronaires were in the 4.5 to 4.7 range but Pressley fiber strengths were fairly low—73,000 to 78,000 pounds per square inch, as were yarn strengths from some of the samples.

Table 12.—Classification of the Nicaraguan cotton crops of 1969-70 and 1970-71 by grades

Type	Equivalent grade [1]	1969-70	1970-71 [2]	1969-70	1970-71 [2]
		1,000 bales	*1,000 bales*	*Percent*	*Percent*
A	Strict Middling	1	1	0.2	0.3
BP	Middling Plus	5	8	1.9	2.2
B	Middling	35	41	11.7	11.8
CP	Strict Low Middling Plus	59	67	19.7	19.6
C	Strict Low Middling	56	66	19.1	19.2
DP	Low Middling Plus	15	15	4.9	4.2
D	Low Middling	8	8	2.6	2.5
AS	Strict Low Middling Very Lt. Spot	2	1	.5	.3
BS	Middling Lt. Spot	96	114	32.2	33.1
CS	Strict Low Middling Lt. Spot	10	12	3.5	3.5
MS	Middling Spotted	(3)	(3)	.1	.1
PS	Strict Low Middling Spotted	2	2	.8	.6
BM	Middling Light Gray	3	6	1.0	1.7
CM	Strict Low Middling Lt. Gray	2	1	.7	.2
MG	Middling Gray	(3)	(3)	.1	(4)
(5)	Low grades	3	2	1.0	.7
	Total	297	344	100.0	100.0

[1] As reported by the National Cotton Classing Office.
[2] Preliminary.
[3] Less than 500 bales.
[4] Less than 0.5 percent.
[5] Types E, DS, F, BG, YG.

Table 13.–Minimum and maximum fiber and spinning test results on samples of specified Nicaraguan and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Middling no staple given 2 samples from Managua	Middling 1-1/16" 4 samples from import market	Middling Lt. Spot, no staple given 4 samples from Managua	St. Low Middling no staple given 3 samples from Managua	Str. Low Middling 1-1/16" 4 samples from import market	Low Middling Plus no staple given 4 samples from Managua	Three U.S. reference qualities		
							Missouri SLM Lt. Spt. 1-1/16" All 100 samples	Missouri SLM White 1-1/16" All 200 samples	Arkansas Stoneville 213 SLM White 1-1/16" All 175 samples
Fiber test results:									
Fiber length:									
2.5 percent span . . . . . inches	1.08-1.10	1.04-1.10	1.04-1.07	1.03-1.04	1.04-1.07	1.04-1.07	1.05-1.08	1.06-1.10	1.03-1.11
Uniformity, 50/2.5 . . . . . percent	-46-	46-47	45-46	43-44	43-46	42-46	45-46	45-46	44-46
Micronaire . . . . . reading	-4.6-	4.7-4.9	4.5-4.7	4.5-4.7	4.5-4.9	4.4-4.7	3.8-4.4	3.8-4.9	4.0-5.1
Fiber strength:									
Zero gage . . . . . Mpsi	-73-	73-75	74-75	73-76	72-77	72-78	75-82	75-84	79-83
1/8 inch gage . . . . . gm/tex	21.5-21.9	19.3-20.3	20.2-21.2	19.4-19.8	18.6-20.4	18.9-20.6	19.4-23.3	20.5-22.8	19.6-21.9
Elongation:									
1/8 inch . . . . . percent	-7.5-	6.8-7.9	6.3-6.9	6.7-7.2	6.2-6.9	6.5-7.3	6.3-7.2	5.9-7.4	6.1-7.1
Neutral content . . . . . percent	-2.0-	1.9-2.1	2.7-3.5	2.2-2.6	1.9-4.5	2.3-3.9	2.9-3.8	2.2-2.8	2.7-3.4
Color, raw cotton:									
Grayness . . . . . number	-1-	-1-	-2-	-2-	0-2	1-3	-3-	2-3	1-3
Yellowness . . . . . number	-4-	4-5	-4-	2-3	4-5	3-4	3-4	2-3	2-4
Composite . . . . . index	-105-	102-104	99-101	97-98	98-106	95-104	91-94	93-101	93-100
Spinning test results:									
Picker & card waste . . . . . percent	-5.3-	5.4-8.9	5.6-6.5	6.1-6.6	6.5-8.5	4.8-7.8	5.8-6.8	5.1-5.9	5.1-6.3
Carded yarn:									
Strength:									
22s. . . . . pounds	-102-	91-101	93-96	89-91	81-100	84-99	91-105	98-108	93-106
50s. . . . . pounds	-36-	30-35	30-32	27-30	25-34	22-34	29-36	32-38	31-37
Elongation:									
22s. . . . . percent	-7.7-	6.7-7.4	6.8-7.3	6.8-6.9	6.4-7.0	6.3-7.1	5.5-6.2	5.5-6.5	5.8-6.0
50s. . . . . percent	-6.0-	5.4-5.8	5.0-5.5	5.0-5.2	4.8-5.8	4.6-5.8	3.7-4.6	3.8-4.9	4.0-4.8
Appearance:									
22s. . . . . index	100-120	110-120	110-120	100-110	100-110	90-120	110-120	110-130	110-120
50s. . . . . index	-90-	-90-	-90-	80-90	80-90	70-90	-90-	80-100	80-100
Imperfections:									
22s. . . . . number	-11-	12-17	10-12	18-25	17-22	13-26	20-34	17-29	16-30
50s. . . . . number	-11-	8-16	16-20	13-28	14-18	12-21	14-23	8-21	12-21
U.S. classer's grade . . . . . percent of samples									
Middling White	100	75	-	-	50	25			
St. Low Mid. White	-	-	25	100	25	25	(See title)	(See title)	(See title)
Low Mid. White	-	-	-	-	-	25			
St. Mid. L.t. Spot	-	25	-	-	-	-			
Middling L.t. Spot	-	-	75	-	-	25			
St. Low Mid. Lt. Spot	-	-	-	-	25	-			
U.S. classer's staple length . . . . . percent of samples									
1-1/32"	-	-	-	-	-	25			
1-1/16"	-	25	75	100	75	25			
1-3/32"	100	50	25	-	25	50			
1-1/8"	-	25	-	-	-	-			

Brazil

Brazil is the third largest exporter of cotton in the world after the United States and the USSR. Exports totaled nearly 1.8 million bales in 1968-69, 1.9 million bales in 1969-70, and 1.2 million bales in 1970-71.

Brazil has two cotton crops: the South Brazilian crop harvested in March through June, and the northeastern crop, harvested in the various States from May to February with August-October the most important months. Practically all Brazilian cotton is saw-ginned.

Cotton in South Brazil.—Usually two-thirds of Brazil's cotton grows in South Brazil, largely in the States of São Paulo and Paraná. Production in this region totaled nearly 1.9 million bales in 1968-69, 2.3 million bales in 1969-70, and 1.9 million bales in 1970-71. Roughly 800,000 bales of this cotton are consumed domestically leaving the remainder for export. The South Brazilian crop is the only large cotton crop that comes on the world market in the late spring.

South Brazil's cotton is raingrown Upland-type cotton, nearly all of it in the "medium long staple" category (1-1/32"-1-3/32"). IAC RM_3 wilt resistant is the leading variety at present with 60 percent of the area in São Paulo State. IAC 12 is being phased out because it is susceptible to wilt but occupied nearly 40 percent of the acreage in São Paulo in 1971-72. These and other varieties are selections from such U.S. lines as Auburn 56, Rex, Deltapine, and an Acala strain introduced from the United States many years ago.

The various States in South Brazil have their own cotton classing services and own standards, although they follow a national system. An exception is Goias which has its cotton classed by the Bolsa de Mercadorias in São Paulo. It is not known how these standards compare with each other and whether cotton classed as a given grade in one State is comparable to cotton classed in the same type in another. For 1972-73, however, South Brazil will have uniform standards that apply to all cotton grown there for the first time.

The "types" of the South Brazilian States take account of grade only. (There is some sample checking of staple length for statistical purposes.) Type 5 is the basis type. The lower the number of the type, the higher the quality of the cotton.

Results of the classification of cotton in the States of São Paulo and Paraná for the 1969-70 and 1970-71 crops are given in tables 15 and 16. The São Paulo results include not only cotton grown within that State but practically all of Goias cotton, two-thirds of Mato Grosso's, and 10 percent of Paraná's. As

Table 14.—Production of cotton in Brazil, 1969-72

State	1969-70	1970-71	1971-72[1]
Northeast Brazil:	*1,000 bales*	*1,000 bales*	*1,000 bales*
Ceara	506	138	275
Paraiba	200	70	120
Pernambuco	156	55	100
Rio Grande do Norte	160	44	88
Other	288	88	244
Total	1,310	395	827
South Brazil:			
São Paulo	1,135	1,035	1,280
Paraná	860	555	420
Minas Gerais	150	70	100
Golas	80	140	400
Other	80	70	100
Total	2,305	1,870	2,300
Grand total	3,390	2,255	3,127

State figures for Northeast from Annual Report of Bolsa de Mercadorias, São Paulo, 1971, p. 44, except for 1971-72, which are commercial estimates.

[1] Preliminary.

Table 15.--Cotton classed in States of São Paulo and Paraná, Brazil, during cotton years beginning August 1

Item	São Paulo				Paraná			
	1967-68	1968-69	1969-70	1970-71 [1]	1967-68	1968-69	1969-70	1970-71
	1,000 metric tons	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*
Total classed	248	314	304	265	155	202	163	110
By types:	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Total	100	100	100	100	100	100	100	100
Type 3	(2)	(2)	(2)	(2)	(2)	--	--	--
Type 4	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Type 4/5	3	1	1	1	4	1	(2)	2
Type 5	16	4	3	6	16	7	2	8
Type 5/6	34	17	11	16	23	20	9	16
Type 6	27	32	26	28	34	33	27	29
Type 6/7	14	29	33	27	16	19	26	21
Type 7	4	11	17	13	5	10	20	13
Type 7/8	1	4	6	5	1	5	10	6
8 and under	1	2	3	4	1	5	6	5
By staple lengths:								
Total	100	100	100	--	100	100	100	100
26 mm	(2)	(2)	(2)	(3)	--	--	--	--
27 mm	(2)	(2)	(2)	(3)	--	--	--	--
28 mm	(2)	(2)	(2)	(3)	--	--	(2)	(2)
29 mm	(2)	(2)	(2)	(3)	--	1	(2)	1
30 mm	1	1	5	(3)	3	7	14	10
30/32 mm [4]	61	51	89	(3)	96	92	85	88
32/34 mm [5]	38	48	6	(3)	1	(2)	(2)	1

[1] To October 20, 1971 only. [2] Less than 0.5 percent. [3] Not available. [4] Equivalent to approximately 1-1/32". [5] Equivalent to approximately 1-1/16" to 1-3/32". Compiled from reports of Bolsa de Mercadorias de São Paulo.

Table 16.--Grade of cotton exported from port of Santos by calendar years, 1969 and 1970

Type	Cotton grown in São Paulo		Cotton grown in other States	
	1969	1970	1969	1970
	1,000 metric tons	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*
Total	256	219	106	54
	Percent	*Percent*	*Percent*	*Percent*
Total	100	100	100	100
Types: 2, 3, 4	1	(1)	(1)	(1)
4/5	1	1	1	(1)
5	5	3	8	3
5/6	18	10	21	13
6	34	25	33	28
6/7	27	34	19	23
7	10	17	11	19
7/8	3	7	4	9
8	1	2	2	4
9 and under	(1)	1	1	1

Compiled from Annual Report of Bolsa de Mercadorias de São Paulo, 1971.

[1] Insignificant volume.

indicated, most of the cotton classed in both São Paulo and Paraná in recent years has been Type 6 or 6/7, but Types 5/6 and 7 are also important. Type 6/7 is the leading type exported but Types 6 and 7 are also important.

There is a fairly large amount of variation in the grade of Brazilian cotton from year to year because of weather during the harvest. In some years when rainfall continues late into the harvest period, a relatively large proportion falls into the lower grades.

The staple length of South Brazil's cotton has been increasing over the years. According to Brazilian cotton classing statistics, only 11 percent of the cotton produced in the state of São Paulo was 30/32 mm (approximately 1-1/32") in 1962 but by 1964, 75 percent was in this category or longer, and, since 1968, 95 percent or more. In 1968-69, 48 percent was classified as 32/34 mm (approximately 1-1/16") but only 6 percent in 1969-70.

Results of Micronaire and Pressley tests made in Brazil on samples from the 1970 cotton crop of the state of São Paulo are compared with results from Mississippi, Texas and California in Table 17 and 18.

The Micronaire results on the 1970 São Paulo crop were considered in Brazil to be about the same as on the 1969 crop but the Pressley strength tests were said to show strengths averaging 4 percent lower.

Results of U.S. fiber and spinning tests and U.S. official classers' determinations on 91 samples of South Brazilian cotton obtained in 1971 in Brazil and in 1970 in importing markets are given in tables 19 and 20.

Fiber lengths of South Brazilian cotton ranged from about 1.00 to 1.10 inches and averaged about the same as for 1-1/32" cotton in the United States. The fiber length varied little throughout the range of Brazilian types. Most of the Micronaire values were between 3.5 and 3.9 which would be fairly low for U.S. cotton of this staple length but still in the no-discount-price range.

Table 17.—Results of Micronaire tests on cotton harvested in 1970 in São Paulo, Mississippi, Texas, and California

Micronaire reading	São Paulo[1]	Mississippi[2]	Texas[2]	California[2]
	Percent of tests	*Percent of tests*	*Percent of tests*	*Percent of tests*
3.2 and under	8	1	10	4
3.3-3.4	10	1	5	2
3.5-3.9	48	10	20	19
4.0-4.4	33	41	30	50
4.5-4.9	1	37	26	25
5.0 and higher	0	10	9	(3)
Total	100	100	100	100

[1] Compiled from Annual Report of Bolsa de Mercadorias de São Paulo, 1971. Based on 6,746 tests on crop harvested in spring of 1970. [2] From Consumer & Marketing Service, USDA, U.S. cotton quality report for ginnings, 1970-71 crop. [3] Less than 0.5 percent.

Table 18.—Results of Pressley fiber-strength tests on cotton harvested in 1970 in São Paulo, Mississippi, Texas and California

Strength in pounds per square inch	São Paulo[1]	Mississippi[2]	Texas[2]	California[2]
	Percent of tests	*Percent of tests*	*Percent of tests*	*Percent of tests*
Under 75,000	5	2	1	0
75,000-79,000	31	23	9	(3)
80,000-84,000	52	53	26	2
85,000-89,000	12	20	37	6
90,000-94,000	0	2	20	12
95,000 and over	0	(3)	7	80

[1] From Annual Report of Bolsa de Mercadorias de São Paulo. Based on 1,677 tests on crop harvested in spring of 1970. [2] From Consumer and Marketing Service, USDA, U.S. Cotton Quality Report for Ginnings, 1970 crop. [3] Less than 0.5 percent.

Table 19.—Average of fiber and spinning test results on samples of specified South Brazilian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Brazilian type, number of samples, where obtained										Some U.S. reference qualities		
											Southwest		South Central
	Type 5 13 Samples from São Paulo	Type 5/6 16 Samples from São Paulo	Type 5/6 4 Samples from import markets	Type 6 14 Samples from São Paulo	Type 6 12 Samples from import markets	Type 6/7 13 Samples from São Paulo	Type 6/7 6 Samples from import markets	Type 7 9 Samples from São Paulo	Type 7 1 Sample from import market	Type 7/8 3 Samples from São Paulo	M Lt. Spot 1-1/32" 75 Samples	SLM Lt. Spot 1-1/32" 75 Samples	SLM White 1-1/32" 100 Samples
Fiber test results:													
Fiber length:													
2.5 percent span . . . . . inches	1.04	1.05	1.05	1.05	1.06	1.02	1.07	1.02	1.03	1.02	1.05	1.06	1.04
Uniformity, 50/2.5 . . . . percent	43	42	44	43	45	42	47	42	46	42	46	46	44
Micronaire . . . . . reading	3.6	3.7	3.8	3.7	3.9	3.6	4.3	3.6	3.7	3.4	3.3	4.1	4.3
Fiber strength:													
Zero gage . . . . . Mpsi	83	85	83	82	80	83	81	82	75	85	86	88	80
1/8 inch gage . . . . . gm/tex	21.3	20.9	21.9	20.7	20.8	20.6	21.0	19.8	20.3	20.8	23.1	23.0	21.2
Elongation:													
1/8 inch . . . . . percent	5.9	5.6	6.2	5.7	5.8	5.5	5.9	5.6	6.1	5.5	6.6	6.0	6.1
Nonlint content . . . . . percent	4.9	5.1	6.7	6.2	6.8	8.4	8.5	10.0	7.3	8.6	2.1	3.9	2.6
Color, raw cotton:													
Grayness . . . . . number	2	2	3	3	3	4	4	4	5	5	2	3	2
Yellowness . . . . . number	5	4	4	4	5	5	4	5	3	5	4	4	3
Composite . . . . . index	100	97	97	94	94	89	86	85	84	82	99	93	97
Spinning test results:													
Picker & card waste . . . . . percent	6.2	8.1	10.1	9.0	10.2	11.5	11.2	13.3	10.7	11.8	6.0	7.0	5.4
Carded yarn:													
Strength:													
22s. . . . . pounds	98	93	100	90	100	85	92	81	99	91	111	108	96
50s. . . . . pounds	33	30	33	30	33	27	31	26	34	30	39	37	32
Elongation:													
22s. . . . . percent	6.3	6.0	6.7	6.0	6.4	5.7	6.2	5.6	6.4	5.7	6.2	5.7	5.9
50s. . . . . percent	4.9	4.6	5.2	4.6	5.0	4.4	4.8	4.5	5.0	4.7	4.6	4.3	4.3
Appearance:													
22s. . . . . index	98	95	98	92	96	92	95	83	90	87	97	103	102
50s. . . . . index	84	82	82	76	81	75	75	69	80	70	67	83	78

Table 19.—Average of fiber and spinning test results on samples of specified South Brazilian and U.S. cottons, and U.S. classer's grade and staple descriptions—Continued

Item	Brazilian type, number of samples, where obtained										Some U.S. reference qualities		
											Southwest		South Central
	Type 5 13 Samples from São Paulo	Type 5/6 16 Samples from São Paulo	Type 5/6 4 Samples from import markets	Type 6 14 Samples from São Paulo	Type 6 12 Samples from import markets	Type 6/7 13 Samples from São Paulo	Type 6/7 6 Samples from import markets	Type 7 9 Samples from São Paulo	Type 7 1 Sample from import market	Type 6/8 3 Samples from São Paulo	M Lt. Spot 1-1/32" 75 Samples	SLM Lt. Spot 1-1/32" 75 Samples	SLM White 1-1/32" 100 Samples
Imperfections:													
22s. . . . . number	21	20	26	24	33	30	36	38	37	35	40	43	21
50s. . . . . number	16	18	22	21	25	27	28	33	30	30	31	33	20
U.S. classer's:													
Grade	SLM Spot	SLM Spot	SLM Lt. Spot	SLM Spot	SLM Lt. Spot	LM Spot	LM Lt. Spot	LM Spot	SLM Lt. Spot	LM Spot	M Lt. Spot	SLM Lt. Spot	SLM White
Staple length	1-1/16"	1-1/16"	1-1/16"	1-1/32"	1-3/32"	1-1/32"	1-3/32"	1-1/32"	1-1/32"	1-1/32"	1-1/32"	1-1/32"	1-1/32"

Table 20.—Minimum and maximum fiber and spinning test results on samples of specified South Brazilian and U.S. cottons, and U.S. classer's grade and staple descriptions[1]

Item	Brazilian type, number of samples where obtained										Some U.S. reference qualities		
											Southwest		South Central
	Type 5 13 samples from São Paulo	Type 5/6 16 samples from São Paulo	Type 5/6 4 samples from import market	Type 6 14 samples from São Paulo	Type 6 12 samples from import market	Type 6/7 15 samples from São Paulo	Type 6/7 6 samples from import market	Type 7 9 samples from São Paulo	Type 7 1 sample from import market	Type 7/8 3 samples from São Paulo	M Lt. Spot 1-1/32" (75 Samples)	SLM Lt. Spot 1-1/32" (100 Samples)	SLM White 1-1/32" (100 Samples)
Fiber test results:													
Fiber length:													
2.5 percent span ..... inches	1.00-1.10	.99-1.13	1.02-1.07	.98-1.07	1.02-1.09	.99-1.06	1.01-1.07	.99-1.03	1.03	1.02-1.03	1.04-1.06	1.05-1.07	1.02-1.10
Uniformity, 50/2.5 ..... percent	42-44	41-44	42-47	41-45	42-48	41-44	42-47	41-44	46	42-43	45-46	44-47	43-45
Micronaire ..... reading	3.2-4.1	3.1-4.1	3.4-4.1	3.4-4.1	3.2-4.4	3.2-4.0	3.4-4.3	3.4-3.9	3.7	3.4-3.5	3.2-3.4	3.6-4.5	3.9-4.7
Fiber strength:													
Zero gage ..... Mpsi	76-89	81-90	79-86	76-86	73-86	80-86	74-86	79-84	75	83-87	86-87	84-95	78-82
1/8 inch gage ..... gm/tex	21.0-22.3	19.8-22.0	21.0-23.2	19.8-21.9	19.9-22.1	19.9-22.1	19.1-21.0	18.3-20.8	20.3	20.2-21.4	22.4-24.0	21.5-24.0	20.7-21.9
Elongation:													
1/8 inch ..... percent	5.4-7.1	5.1-6.1	5.7-6.7	5.4-7.0	5.3-6.6	5.1-6.1	5.3-6.2	5.2-6.1	6.1	5.3-5.7	6.3-6.8	5.1-6.7	4.9-7.9
Nonlint content ..... percent	3.2-6.1	5.5-6.6	6.4-7.5	4.0-7.4	5.8-7.6	7.5-9.5	6.6-10.2	7.8-12.0	7.5	8.2-8.9	1.9-2.2	3.2-5.1	2.2-3.0
Color, raw cotton:													
Grayness ..... number	1-2	2-3	2-3	-3-	2-3	3-4	3-5	4-5	5	-5-	-2-	2-5	2-3
Yellowness ..... number	4-5	3-5	4-5	3-5	4-5	4-5	3-5	4-5	3	-5-	4-5	3-4	2-3
Composite ..... index	97-102	93-100	94-101	92-96	92-97	88-92	85-94	85-88	84	81-83	98-100	83-97	95-99
Spinning test results:													
Picker & card waste ..... percent	5.6-10.2	6.5-9.3	9.2-12.5	7.2-10.6	7.6-12.4	9.9-13.0	10.9-14.0	10.6-14.7	10.7	11.4-12.5	5.8-6.1	6.3-7.9	5.1-5.6
Carded yarn:													
Strength:													
22s ..... pounds	94-106	85-103	90-112	82-102	86-112	72-100	80-100	69-95	99	87-93	107-113	99-115	93-101
50s ..... pounds	29-37	26-35	28-39	26-35	26-39	23-35	27-33	23-31	34	29-31	38-40	35-41	29-36
Elongation:													
22s ..... percent	5.9-7.0	5.7-6.8	6.2-7.2	5.5-6.1	5.7-6.8	5.0-6.4	6.0-6.6	5.2-6.1	6.4	5.6-5.9	5.8-6.4	5.3-6.2	5.3-6.6
50s ..... percent	4.3-5.7	4.3-5.3	4.9-5.6	4.2-5.1	4.8-5.2	3.9-4.9	4.6-5.1	3.8-4.9	5.0	4.6-4.8	4.4-4.7	3.9-4.8	5.6-4.8
Appearance:													
22s ..... index	90-120	90-110	90-100	90-110	80-110	90-100	80-100	70-100	90	80-90	90-100	80-120	90-120
50s ..... index	80-90	70-90	80-90	70-90	60-100	60-90	70-80	60-90	80	70	60-70	70-100	70-100
Imperfections:													
22s ..... number	9-33	9-30	22-38	15-32	12-72	20-40	31-47	21-46	37	32-40	36-47	32-54	15-34
50s ..... number	9-22	10-28	21-27	15-28	17-41	17-36	21-35	17-44	30	29-30	28-37	24-47	14-29
U.S. classer's grade ..... percent of samples													
M Lt. Spot	--	--	--	--	8	--	--	--	--	--			
SLM Lt. Spot	23	31	75	36	50	--	--	--	--	--	See above	See above	See above
LM Lt. Spot	--	--	--	--	17	24	50	11	100	--			
Mid. Spotted	39	13	--	--	--	--	--	--	--	--			
SLM Spotted	38	56	25	57	25	38	17	--	--	--			
LM Spotted	--	--	--	7	--	38	33	89	--	100			
U.S. classer's staple length ..... percent of samples													
1-1/32"	13	44	25	72	--	69	--	78	100	100			
1-1/16"	87	50	50	21	34	31	33	22	--	--			
1-3/32"	--	6	--	7	33	--	67	--	--	--			
1-1/8"	--	--	25	--	25	--	--	--	--	--			
1-5/32"	--	--	--	--	8	--	--	--	--	--			

[1] Based on samples obtained during 1970 from importing markets and 1971 from Brazil.

The samples of South Brazilian cotton generally appeared to show a considerable degree of yellowness on the Colorimeter scale and were largely classed by U.S. classers as Spotted or Light Spotted cotton. The amount of picker and card waste varied from the same as U.S. Low Middling plus in the Type 5 grade down to more than Good Ordinary for Type 5/6 and below. Yarn strengths were largely low; yarn imperfections were low to average in Types 5 and 5/6 but high in the lower types. Type 6, the most important type quantitatively, might be compared with U.S. Southwest area Strict Low Middling Light Spotted 1-1/32" cotton.

Cotton in Northeast Brazil.–Cotton production in Northeast Brazil averaged 1,244,000 bales annually from 1965 through 1969 but in 1970 a severe drought in some sections and floods in others brought cotton production down to 395,000 bales (table 21). In 1971 the crop recovered to 827,000 bales. About 450,000 to 500,000 bales of the Northeast crop usually are consumed in Brazil and the remainder, if any, is exported.

Northeast Brazil's cotton is concentrated in the northeastern tip of the country, with more than three-fourths in the States of Ceara, Paraiba, Pernambuco, and Rio Grande do Norte. Other cotton producing States include Piaui, Maranhao, Alagoas, Sergipe, and Bahia.

Three principal varieties of cotton are grown in Northeast Brazil: Serido, Sertao, and Mata. The names are trade names but usually also indicate staple length (table 22). The various States have their own cotton classification services. According to combined statistics for several of the States, about half of the Northeast Brazil cotton crop is 32/34 mm in staple length, which is reported to be the approximate equivalent of 1-1/16". About 17 percent is 34/36 mm, or 1-3/32", or longer, and a third is 30/32 mm, or 1-1/32", or shorter. By grade, Type 3 was 30 percent of the 1969-70 crop; Type 4, 38 percent; and Type 5, 25 percent.

Table 21.–Production of cotton in Northeast Brazil, 1969-72 by staple lengths

Item	1969-70	1970-71	1971-72
	1,000 bales	*1,000 bales*	*1,000 bales*
Production	1,310	395	827
By staple lengths:	*Percent*	*Percent*	*Percent*
Mata (13/16"-1")	17	29	18
Sertao (1-1/32"-1-3/32")	65	48	70
Serido (over 1-3/32")	18	23	13

Compiled from Brazil's report to the 13th Plenary Meeting, ICAC, Guatemala, 1971.

Table 22.–Classification of cotton in Northeast Brazil, crop of 1969-70[1]

Staple length			Type	
Mms.	*Estimated[2] equivalent in inches*	*Percent*		*Percent*
24/26	7/8 to 15/16	(3)	2	1
26/28	15/16 to 1	1	3	30
28/30	1 to 1-1/32	21	4	38
30/32	1-1/32 to 1-1/16	10	5	25
32/34	1-1/16 to 1-3/32	51	6	5
34/36	1-3/32 to 1-5/32	12	7	1
36/38	1-5/32 to 1-3/16	3	8	(3)
38/40	1-3/16 to 1-1/4	2	9	(3)
Total		100		100

Compiled from Annual Report of Bolsa de Mercadorias de São Paulo, São Paulo, 1971.

[1] Includes data for Sertao, Serido, and Mata cotton from combined results of State classification services in Ceara, Pernambuco, Rio Grande do Norte, Alagoas, Sergipe, and Bahia. Does not include data from Paraiba and other States. Sample was about half of the crop. [2] Based on estimates from government and commercial sources in Brazil but there is some variance in these estimates. [3] Less than 0.5 percent.

Serido is named after a river region and is usually applied to northeastern cotton having a staple length of 34 mm (1-1/8") or longer. Production usually runs upwards of 40,000 bales, comprising nearly one-fourth of Northeast Brazil's production. The Serido crop usually is entirely consumed by Brazilian mills.

Serido is a perennial *Gossypium hirsutum*, Marie Galante variety, that grows as a shrub usually to a height of about 6 feet and has tap roots sometimes extending 15 feet into the ground. The shrub bears cotton bolls for from 7 to 10 years. Serido cotton grows in the interior only where rains are scarce, not over 20 inches annually. Serido cotton is said commercially to be fine fibered with a Micronaire of 3.3 to 3.7 and to have a Pressley strength of 75,000 to 82,000 pounds per square inch. Our tests made in 1971 on 4 samples of Type 3-34/36 mm, Serido cotton confirmed the Micronaire readings and gave fiber lengths comparable to 1-5/32" and 1-3/16" cotton (tables 9 and 10). Pressley strengths, however, ran up to 92,000 pounds. The samples might be considered to be comparable to SLM White Acala 1517 in the United States. They averaged a little lower in carded yarn strength but higher in yarn appearance and lower in yarn imperfections.

Sertao cotton accounts for more than half of Northeast Brazil's production—upwards of 450,000 bales annually. It is of the same perennial variety as Serido and also is named after a region, but the name is applied to cotton stapling a little shorter. Sertao cotton is reported commercially to be 1-1/32"-1-3/32" in staple length and not as creamy as Serido, and to have a micronaire of 3.3 to 3.6 and a Pressley strength of 77,000 to 82,000 pounds. Our tests in 1971 on 8 samples confirm the commercial Micronaire readings but our Pressley strengths ran as high as 87,000 pounds and some of the fiber lengths were comparable to 1-1/8" cotton. Perhaps SLM White 1-1/8" from the South-Central region of the United States could be considered fairly comparable to the Sertao samples except that the latter were yellower in color and had greater non-cotton content.

Moco is a nickname applied to both Serido and Sertao cotton.

Mata is an annual Upland type that is grown in areas immediately behind the coast where the rainfall is adequate but not too heavy for this type of cotton. Production usually totals between 30,000 and 35,000 tons annually. According to a Brazilian commercial statement, Mata cotton has a staple length of 15/16" to 1", a usual Micronaire of 3.8 to 4.3, and a Pressley breaking strength of 74,000 and 83,000 pounds per square inch. This description is borne out by results on two samples tested in 1971 (table 11). The samples appeared to resemble U.S. SLM White or SLM Light Spotted cotton of 15/16" to 1" grown in the Southwest.

Table 23.—Average of fiber and spinning test results on samples of specified North Brazilian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Brazilian type, number of samples where obtained				Some U.S. reference qualities		
	Serido Type 3 34/36 4 samples from Recife São Paulo	Sertao Type 3/4 1-3/32" 2 samples from import market	Sertao Type 4 32-34 mm. 4 samples from São Paulo	Sertao Type 5 32-34 mm. 2 samples from Recife	Acala 1517 All SLM White Samples (160)	Acala 1517 All SLM Lt. Spot Samples (60)	South Central All SLM White 1-1/8" Samples (80)
Fiber test results:							
Fiber length:							
2.5 percent span ..... inches	1.20	1.05	1.12	1.14	1.17	1.18	1.13
Uniformity, 50/2.5 ..... percent	42	38	42	42	45	42	44
Micronaire ..... reading	3.5	3.6	3.5	3.6	3.8	3.1	4.0
Fiber strength:							
Zero gage ..... Mpsi	89	86	83	84	93	88	82
1/8 inch gage ..... gm/tex	24.8	21.0	22.6	23.5	27.1	24.9	23.9
Elongation:							
1/8 inch ..... percent	6.1	5.8	6.7	6.1	5.3	5.3	6.4
Nonlint content ..... percent	5.8	8.0	8.2	8.2	3.1	6.1	3.0
Color, raw cotton:							
Grayness ..... number	1	3	2	3	1	2	1
Yellowness ..... number	4	5	5	4	3	4	2
Composite ..... index	101	96	99	97	104	98	100
Spinning test results:							
Picker & card waste ..... percent	8.7	11.2	8.6	12.4	7.5	11.6	5.9
Carded yarn:							
Strength:							
22s ..... pounds	120	98	112	109	136	130	109
50s ..... pounds	43	31	40	37	51	50	38
Elongation:							
22s ..... percent	7.3	6.4	7.1	7.2	6.8	6.9	6.8
50s ..... percent	5.8	4.7	5.6	5.4	5.7	5.8	5.4
Appearance:							
22s ..... index	112	110	98	115	94	67	98
50s ..... index	92	85	82	95	73	63	75
Imperfections:							
22s ..... number	12	20	16	13	32	94	22
50s ..... number	14	18	16	12	24	75	19
U.S. classer's:							
Grade	M Lt. Spot SLM Spot	SLM Spot	SLM Spot	SLM Spot	SLM White	SLM Lt. Spot	SLM White
Staple length	1-1/16", 1-3/16"	1-3/32"	1-1/16"	1-1/8"	1-5/32"	1-1/8"	1-1/8"

Table 24.—Minimum and maximum fiber and spinning test results on samples of specified North Brazilian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Brazilian type, number of samples where obtained				Some U.S. reference qualities		
	Seridó Type 3 34/36 4 samples from Recife São Paulo	Sertao Type 3/4 1-3/32" 2 samples from import markets	Sertao Type 4 32-34 mm. 4 samples from São Paulo	Sertao Type 5 32-34 mm. 2 samples from Recife	Acala 1517 All SLM white 160 samples	Acala 1517 All SLM Lt. Spot 60 samples	South Central All SLM white 1-1/8" 80 samples
Fiber test results:							
Fiber length:							
2.5 percent span ..... inches	1.19-1.22	1.04-1.06	1.11-1.14	1.13-1.16	1.14-1.21	1.18-1.19	1.12-1.14
Uniformity, 50/2.5 ..... percent	41-42	34-42	41-44	41-42	43-47	41-43	42-45
Micronaire ..... reading	3.3-3.9	-3.6-	3.4-3.6	3.6-3.7	3.2-4.2	3.0-3.1	3.7-4.4
Fiber strength:							
Zero gage ..... Mpsi	85-92	86-87	81-85	83-84	86-97	87-90	80-86
1/8 inch gage ..... gm/tex	23.8-26.6	20.6-21.5	22.3-22.9	23.4-23.9	25.0-29.0	24.5-25.1	22.6-24.6
Elongation:							
1/8 inch ..... percent	5.9-6.4	-5.8-	6.5-6.9	6.1-6.2	4.9-5.6	5.1-5.4	6.1-6.6
Nonlint content ..... percent	5.4-6.2	6.3-6.6	6.5-10.7	7.8-8.7	2.1-3.8	4.9-7.2	2.5-3.9
Color, raw cotton:							
Grayness ..... number	1-2	-3-	-2-	-3-	0-2	2-3	1-2
Yellowness ..... number	4-5	-5-	-5-	-4-	2-3	-4-	1-3
Composite ..... index	100-101	96-97	98-100	96-97	100-104	97-100	96-103
Spinning test results:							
Picker & card waste ..... percent	7.6-9.5	9.6-12.8	8.2-9.1	12.4-12.5	6.6-9.8	10.5-12.7	5.3-6.8
Carded yarn:							
Strength:							
22s ..... pounds	115-124	-98-	111-113	108-110	124-140	128-133	95-120
50s ..... pounds	41-45	29-31	39-40	-37-	49-54	48-51	32-42
Elongation:							
22s ..... percent	6.9-7.7	6.2-6.7	6.8-7.2	7.0-7.3	6.2-6.9	6.9-7.0	6.1-7.4
50s ..... percent	5.3-6.2	4.5-4.9	5.5-5.6	5.3-5.4	5.5-6.2	5.7-5.9	4.7-6.2
Appearance:							
22s ..... index	90-130	100-120	90-110	110-120	60-110	60-70	80-110
50s ..... index	90-100	80-90	80-90	90-100	60-90	60-70	70-80
Imperfections:							
22s ..... number	7-19	16-23	14-16	11-15	15-61	78-110	12-33
50s ..... number	9-19	16-21	15-17	11-14	11-50	65-89	10-28
U.S. classer's grade ..... percent of samples							
Mid. Lt. Spot	50	--	--	--			
SLM Spot	50	100	100	100			
					(See title)	(See title)	(See title)
U.S. classer's staple length ..... percent of samples							
1-1/32"	--	--	25	--	--	--	
1-1/16"	25	50	50	--	--	--	(See
1-3/32"	25	--	--	--	--	--	title)
1-1/8"	--	50	25	50	12	100	
1-5/32"	--	--	--	50	50	--	
1-3/16"	50	--	--	--	38	--	

Table 25.—Average of fiber and spinning test results on samples of specified North Brazilian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	N. Brazil Mata Type 4 28/29 mm. 2 samples from Recife	U.S. reference quality
		Southwest SLM White 1" 100 samples
Fiber test results:		
Fiber length:		
2.5 percent span ..... inches	0.95	0.99
Uniformity, 50/2.5..... percent	48	47
Micronaire..... reading	4.2	4.1
Fiber strength:		
Zero gage..... Mpsi	82	88
1/8 inch gage ..... gm/tex	21.8	21.8
Elongation:		
1/8 inch..... percent	5.7	6.7
Nonlint content ..... percent	5.5	2.9
Color, raw cotton:		
Grayness..... number	2	2
Yellowness ..... number	4	4
Composite ..... index	99	98
Spinning test results:		
Picker & card waste ..... percent	7.8	5.6
Carded yarn:		
Strength:		
22s ..... pounds	331	343
50s ..... pounds	101	102
Elongation:		
22s ..... percent	7.1	7.0
50s..... percent	6.1	6.1
Appearance:		
22s ..... index	120	122
50s ..... index	120	114
Imperfections:		
22s ..... number	2	50
50s ..... number	1	30
U.S. classer's:		
Grade	M. Lt. Spot	SLM White
Staple length	15/16"	1"

Colombia

Colombia has become an important cotton producing country but production declined from a peak of 640,000 bales in 1968-69 to 540,000 bales in 1970-71. Around 340,000 bales are consumed domestically each year. Exports totaled 250,000 bales in 1969-70 and 175,000 bales in 1970-71.

Colombia has two distinct cotton growing zones. In the Central, or Interior, Zone where production totaled 183,000 bales in 1970-71 and about 161,000 bales in 1971-72, cotton is usually harvested in August and September. In the Northern, or Atlantic, Zone where production totaled 357,000 bales in 1970-71 and 409,000 bales in 1971-72, cotton is harvested from the end of December through March. Domestic mills consume practically all of the cotton grown in the Central Zone and much of the cotton grown in the Atlantic Zone.

About 20 percent of Colombia's cotton acreage is under irrigation. All of the cotton is handpicked and saw-ginned.

In 1969-70, 80 percent of the cotton produced was Deltapine Smooth Leaf. Cotton growers were said to have had problems with 7th or 8th generation seed then being grown, however, and for the 1970-71 season large quantities of Deltapine 16 seed were imported. This variety now accounts for 42 percent of production, Deltapine Smooth Leaf for 38 percent, Acala 1517 BR-2 for 8 percent, and Stoneville 213 for 8 percent. The remaining 4 percent consists of DP-45 and Coker 201.

All of the Acala 1517 BR-2 is grown in the Valle del Cauca in the Central Zone where it is the only variety grown. All but about 2,000 bales of a production of around 9,000 bales is exported. In other cotton growing areas, growers can raise any of the varieties noted.

The Colombian crop is reported to be 5 percent, 1-1/32", 30 percent, 1-1/16", 55 percent, 1-3/32", and 10 percent, 1-5/32" to 1-1/4". As for grades, it was reported in October 1971 that about 40 percent of the Colombian cotton crop is Strict Low Middling, 30 percent Low Middling, and 10 percent Strict Low Middling Light Spotted.

Table 26.—Fiber length, fiber strength and Micronaire of Colombian cotton, 1970-71[1]

Zone and variety	Areas reporting	Fiber length 2.5% span	Fiber strength Zero gage	Micronaire
		Inches	*Mpsi*	*Reading*
Interior:				
DP 16	10	1.12 - 1.15	71 - 83	4.0 - 4.9
DP 45	7	1.08 - 1.17	76 - 83	4.2 - 4.8
DP Smoothleaf	8	1.10 - 1.13	71 - 84	3.9 - 5.1
Atlantic:				
DP 16	11	1.09 - 1.16	71 - 81	4.2 - 5.0
DP 45	2	1.12 - 1.13	72 - 80	4.0 - 4.4
DP Smoothleaf	8	1.08 - 1.17	73 - 82	4.2 - 4.9
S. Ville	4	1.05 - 1.11	72 - 82	4.4 - 5.2

Compiled from reports of Instituto Tecnologico, Medellin.

[1] Average minimum and maximum values for samples from number of areas indicated.

Table 27.--Minimum and maximum fiber and spinning test results on samples of specified Colombian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Acala 1517 M 1-5/32" 2 samples from import markets in Europe	A U.S. comparison Acala 1517 M White Average all 150 samples	M, SLM 1-1/16" 1-3/32" 4 samples from import markets in Europe	U.S. reference quality: Miss. SLM White 1-3/32" All 375 samples
Fiber test results:				
Fiber length:				
2.5 percent span ..... inches	-1.17-	1.17	1.09-1.11	1.07-1.14
Uniformity, 50/2.5..... percent	47-48	45	48-49	41-46
Micronaire ..... reading	-3.7-	3.8	4.7-4.9	3.9-4.9
Fiber strength:				
Zero gage..... Mpsi	-90-	93	75-79	78-87
1/8 inch gage ..... gm/tex	26.5-26.9	27.1	22.7-23.3	22.1-24.8
Elongation:				
1/8 inch..... percent	-5.6-	5.3	6.6-7.2	5.4-7.0
Nonlint content ..... percent	5.2-5.4	3.1	4.6-6.1	2.6-3.8
Color, raw cotton:				
Grayness ..... number	-2-	1	1 - 3	1 - 3
Yellowness ..... number	-4-	3	- 3 -	1 - 3
Composite ..... index	-97-	104	95-102	95-102
Spinning test results:				
Picker & card waste ..... percent	9.9-10.2	7.5	7.0-11.7	5.5-7.1
Carded yarn:				
Strength:				
22s..... pounds	-138-	136	105-112	102-112
50s..... pounds	50-51	51	38-41	32-39
Elongation:				
22s..... percent	6.7-7.0	6.8	6.3-7.3	6.3-7.7
50s..... percent	-5.4-	5.7	5.2-5.7	4.8-6.0
Appearance:				
22s..... index	-120-	98	100-130	90-110
50s..... index	80-90	75	80-100	70-90
Imperfections:				
22s..... number	11 - 17	24	12-22	11-24
50s..... number	- 14 -	18	7-17	9-24
U.S. classer's grade ..... percent of samples				
SLM White.....	50	(See	75	(See
LM + White	--	title)	25	title)
SLM Light Spotted	50		--	
U.S. classer's staple length.... percent of samples				
1 1/6"	--	--	25	
1 3/32"	--	--	50	(See
1 1/8"	--	--	25	title)
1 5/32"	100	86	--	
1 3/8"	--	14	--	

Peru

Peru's cotton production totaled around 400,000 bales in both 1969-70 and 1970-71, which was considerably less than the 600,000 bales produced each year in the early 1960's. Consumption currently runs about 120,000 bales annually and the remainder is exported.

Peru produces two principal types of cotton, extra-long staple and Tanguis. The extra-long staples are grown principally in the Piura Valley in northern Peru. The entire crop is irrigated, handpicked and roller-ginned. The crop is harvested from June to September. The principal extra-long staple variety is Pima, a *Gossypium barbadense* variety, original stocks of which came from the United States. Pima has a staple length of 1-1/2" to 1-5/8" and, with Giza 45 from Egypt, is the longest staple cotton in quantity production in the world. Pima is also one of the finest fibered cottons produced and has a high fiber strength. Production totals around 100,000 bales a year, which is largely exported.

Pima S-1 and S-2 varieties, also *G. barbadense,* were introduced into Peru a number of years ago from the United States. There is now a small production collectively termed Supima. These varieties average about 1-7/16" in staple length, or about an eighth of an inch shorter than Pima, but have about the same fiber fineness and if anything are little higher in fiber strength.

There also is a small production of Del Cerro, an extra-long staple Upland or *G. hirsutum* variety, from the United States. Average staple length is 1-3/8" and the cotton is fine fibered and has a high strength. These other extra-long staple cottons are also irrigated, handpicked, roller-ginned, and harvested from June through September.

Tanguis, another *G. barbadense* variety that originated in Peru, is unusual among the world's cotton in having a fairly long staple length, around 1-3/16", but also an extremely high fiber thickness—a Micronaire averaging around 5.5. Tanguis production totals between 250,000 and 350,000 bales, or two-thirds of Peru's total production. The crop is picked, depending on location, from November into the following July. All of the crop is irrigated and all is handpicked. Tanguis cotton is saw-ginned.

Tanguis cotton is considered to be one of the whitest cottons grown in the world. The fiber coarseness is said to make it especially suitable for blending with wool in wool-cotton yarns.

Peru also produces a very small quantity of Aspero variety cotton, which is said to have a staple length of 1 to 1-1/16", a Micronaire of 6.5, and a Pressley strength of 80,000 pounds per square inch. It is grown in northern Peru and is harvested in August-November.

Peru has physical standards for cotton grades, based on color, cleanliness, and appearance of ginned cotton, but no statistics are available giving the grade and staple length breakdown of the crop.

For Pima and Supima varieties, the grades are Extra, 1, 1-1/4, 1-1/2, 1-3/4, and 2 with No. 1 the base grade. Pima 1, 1-1/4, and 1-1/2 grades are quoted on the Liverpool Exchange for each of 1-5/8, 1-9/16, and 1-1/2 inch staple lengths. Tanguis cotton has separate standards and Grades 2, 2-1/2, 3-1/2, 4, 5, 6, and 7. Grade 2-1/2 and staple length 1-3/16" is the base quality on the Liverpool exchange.

Table 28.–Production and exports of cotton, Peru, calendar years 1969 and 1970

Variety	Production		Exports	
	1969	1970	1969	1970
Extra-long staples:	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*
Pima	90	117	107	85
Pima S-1	16	23	19	19
Pima S-2	0	0	0	0
Del Cerro	15	12	12	10
Karnak	2	1	2	2
Subtotal	123	153	140	116
Tanguis	274	252	265	188
Aspero	6	2	2	4
Total	403	407	407	308

Compiled from reports of Camara Algodonero del Peru.

Table 29.–Staple length, Micronaire, and Pressley fiber strength of Peruvian cotton by varieties

Variety	Staple length	Micronaire		Fiber strength	
		1969	1970	1969	1970
Pima:	*Inches*	*Reading*	*Reading*	*1,000 pounds*	*1,000 pounds*
Average	1-9/16	3.8	3.4	94	94
Range	1-1/2 -1-5/8	3.1-4.2	2.7-4.2	90-100	90-100
Pima S-1 and S-2:					
Average	1-7/16	3.4	4.0	98	97
Range	1-3/8 -1-1/2	3.3-3.6	3.6-4.3	97-99	91-102
Del Cerro:					
Average	1-3/8	--	3.4	--	97
Range	1-5/16-1-7/16	--	2.8-3.8	--	92-102
Karnak:					
Average	1-1/2	--	3.9	--	98
Range	1-7/16-1-9/16	--	3.5-4.2	--	90-103
Tanguis:					
Average	1-3/16	5.4	5.6	85	84
Range	1-5/32-1-1/4	4.4-6.6	4.7-6.4	78-90	75-94

Staple length data from Dec. 18, 1968 publication of International Cotton Advisory Committee. Other data from Annual Report, 1970, of Camara Algodonero del Peru.

Table 30.–Minimum and maximum fiber and spinning test results on samples of specified Peruvian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Pima Grade 1 2 samples from Peru	Pima Grade 1 3 samples from import markets	A U.S. reference quality Amer. Pima S-4 Grade 3 1-3/8" all 150 samples	Del Cerro Grade 1 1 sample from an import market
Fiber test results:				
Fiber length				
Upper quartile array .....inches	1.42-1.47	1.35-1.49	1.43-1.53	1.26
Coefficient of variation.....percent	41-46	39-44	30-36	46
Micronaire.....reading	2.9-3.5	2.9-3.4	3.3-3.9	4.1
Fiber strength:				
Zero gage..... Mpsi	92-98	89-94	99-104	99
1/8" gage..... g/tex	27.6-28.2	29.8-30.0	34.7-36.9	28.5
Elongation:				
1/8" .....percent	-7.6-	6.8-7.7	5.9-7.1	5.7
Nonlint content.....percent	2.8-3.5	2.7-4.0	1.8-4.5	3.1
Color:				
Grayness ..... number	-3-	-3-	3-4	1
Yellowness..... number	-6-	-6-	4-5	4
Composite..... index	95-96	94-96	89-93	104
Spinning test results:				
Picker and card waste ... percent	8.1-8.7	8.1-11.0	6.7-10.1	10.6
Comber waste ..... percent	14.9-17.4	15.9-20.1	16.0-19.2	17.5
Strength:				
50s ..... pounds	66-70	58-64	68-73	63
80s ..... pounds	35-38	31-35	36-40	35
Elongation:				
50s ..... percent	6.4-6.5	6.3-6.4	6.0-6.4	5.6
80s ..... percent	5.5-5.8	5.4-5.8	4.9-5.5	4.9
Appearance:				
50s .....index	100-110	100-110	100-120	110
80s .....index	100-110	90-120	100-120	110
Imperfections:				
50s..... number	4-5	2-6	2-5	3
80s..... number	4-4	3-7	1-5	2
U.S. classer's grade ..... percent of samples				
Pima Grade 2	50	67	(See	--
Pima Grade 3	50	33	title)	--
Strict Middling White +	--	--		100
U.S. classer's staple length.... percent of samples				
1-1/4 inches.....	--	--		100
1-7/16 inches.....	--	20	(See	--
1-1/2 inches	100	80	title)	--

Table 31.—Minimum and maximum fiber and spinning test results on samples of specified Peruvian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade 2 1/2		Grade 3		Grade 3½	U.S. reference qualities	
	2 samples from Peru	3 samples from import markets	3 samples from Peru	2 samples from an import market	2 samples from Peru	comparison California Acala SJ-1 M 1 1/8" All 275 samples	comparison Miss. Delta cotton with Micronaire of 5.0 and higher All 250 samples
Fiber test results:							
Fiber length:							
2.5 percent span ..... inches	1.22-1.24	1.24-1.27	1.21-1.25	1.24-1.26	1.21-1.28	1.09-1.14	1.04-1.11
Uniformity, 50/2.5 ..... percent	46-47	-48-	46-49	-49-	-47-	45-46	43-48
Micronaire ..... reading	5.5-5.6	5.1-5.2	5.6-5.8	5.3-5.5	5.3-5.5	4.0-4.4	5.0-5.4
Fiber strength:							
Zero gage ..... Mpsi	86-87	84-85	86-89	83-88	87-89	91-104	80-86
1/8 inch gage .....gm/tex	25.8-25.9	26.9-27.6	26.7-26.9	26.4-28.3	26.6-27.4	24.7-27.5	20.7-24.2
Elongation:							
1/8 inch ..... percent	8.1-8.2	7.6-7.7	7.2-7.8	7.1-7.9	7.5-8.1	5.0-6.6	5.0-7.0
Nonlint cotton ..... percent	-1.2-	1.6-2.3	1.8-1.9	-1.7-	1.4-2.2	1.9-3.0	2.0-4.8
Color; raw cotton:							
Grayness ..... number	-1-	-0-	-1-	-0-	0-2	-1-	1-3
Yellowness ..... number	-4-	-4-	4-5	-3-	3-4	-3-	3-4
Composite ..... index	-105-	-107-	104-105	-106-	101-106	101-103	96-101
Spinning test results:							
Picker & card waste ..... percent	-6.1-	5.9-7.5	6.0-7.0	-6.0-	6.9-7.4	4.8-5.7	5.0-7.3
Carded yarn:							
Strength:							
22s .....pounds	-113-	122-124	113-116	-117-	-117-	119-129	92-107
50s .....pounds	-35-	39-40	34-36	-37-	-37-	42-48	28-38
Elongation:							
22s..... percent	-7.5-	7.3-7.4	7.0-7.4	-7.3-	-7.4-	5.0-5.7	5.5-6.9
50s..... percent	-5.7-	5.4-5.9	5.3-5.6	-5.7-	-5.7-	3.6-4.8	3.7-5.6
Appearance:							
22s..... index	-130-	-130-	-130-	-130-	-130-	110-130	100-120
50s..... index	-110-	100-120	110-120	-110-	-110-	80-100	80-100
Imperfections:							
22s..... number	-1-	1-3	1-2	-1-	-2-	15-29	7-16
50s..... number	-2-	2-3	-3-	-2-	-3-	10-25	6-15
U.S. classer's grade ..... percent of samples							
Strict Mid. White	100	67	100	100	100	(See	--
Mid. White	--	33	--	--	--	title)	10
Strict Low Mid. White	--	--	--	--	--		70
Low Mid. White	--	--	--	--	--		10
St. Low Mid. Lt. Spot	--	--	--	--	--		10
U.S. classer's staple length ... percent of samples							
1-5/32"	--	--	33	--	--	(See	--
1-3/16"	100	67	67	100	50	title)	--
1-1/4"	--	33	--	--	50		--
1-3/32"	--	--	--	--	--		30
1-1/16"	--	--	--	--	--		70

EUROPE

Greece

Cotton production in Greece is estimated in 1971-72 at 542,000 bales compared to 498,000 bales in 1970-71 and a previous peak of 510,000 bales in 1969-70. Domestic consumption has been rising steadily in recent years and is expected to total 275,000 bales in 1971-72. Exports in 1971-72 may total 345,000 bales compared to 328,000 bales in 1970-71 and a previous peak of 309,000 bales in 1967-68.

Some 93 percent of Greece's cotton acreage is now irrigated. An effort has been made to introduce machine picking in Greece but in 1971 only about 3,200 acres, or 1.3 percent of the total acreage, was so harvested. All of Greece's cotton is saw-ginned. The ginning season runs officially from August 15 to April 30 but most of the crop is ginned from October through January.

All varieties of cotton grown for many years in Greece have been of the American Upland variety. The 4-S variety, first grown commercially in 1964, has increased rapidly in popularity and now accounts for 87 percent of the total cotton acreage. This variety was developed from crossing 10E, an earlier variety developed in Greece, with a selection from the old American Wilds variety. Other varieties grown in Greece in 1971 were Coker 100W, with 10 percent of the acreage, and Acala 4-42, with 3 percent of the acreage, both introduced originally from the United States.

The Hellenic Cotton Board, a government agency, classifies Greek cotton production bale by bale in order to standardize and improve cotton production. Cotton classification is made according to the

Table 32.--Staple length and grade of the Greek cotton crop, 1968-70

Item	1968	1969	1970	1968	1969	1970
	1,000 bales	*1,000 bales*	*1,000 bales*	*Percent*	*Percent*	*Percent*
Staple length:						
25 mm. (1 inch) and shorter	1	(1)	(1)	0.2	-	-
26 mm. (1-1/32 inches)	6	1	(1)	2.1	0.3	0.1
27 mm. (1-1/16 inches)	55	18	11	19.5	4.0	2.6
28 mm. (1-3/32 inches)	217	381	410	76.7	88.0	95.4
29 mm. (1-1/8 inches)	4	33	8	1.5	7.7	1.9
30 mm. (1-5/32 inches)	(1)	(1)	(1)	--	--	--
Total	283	433	429	100.0	100.0	100.0
Grade:						
White:						
3 - Good Middling	1	3	2	.3	.8	.4
3-1/2 - G.M./S.M.	9	29	24	3.2	6.8	5.7
4 - Strict Middling	123	236	209	43.4	54.5	48.7
4-1/2 - S.M./M.	80	130	124	28.0	30.0	28.9
5 - Middling	43	28	46	15.1	6.5	10.7
5-1/2 M./S.L.M.	13	3	13	4.6	0.6	3.1
6 - Strict Low Middling	3	1	4	1.2	0.1	.9
6-1/2 - S.L.M./L.M.	1	(1)	1	.4	.1	.1
7 and lower - L.M. and lower	1	(1)	(1)	.4	.1	--
Total	274	430	423	96.6	99.5	98.5
Light Spotted:						
4 - Strict Middling	2	1	4	0.7	0.3	1.0
5 - Middling	4	1	1	1.5	.1	.3
6, 7 - S.L.M. and L.M.	1	(1)	(1)	.4	--	.1
Total	7	2	5	2.6	0.4	1.4
Spotted, tinged and gray total:	2	1	1	0.8	.1	.1
Grand total, grades	283	433	429	100.0	100.0	100.0

Compiled from monthly bulletins of the Hellenic Cotton Board.
[1] Less than 500 bales.

Table 33.—Fiber and spinning test results on samples of specified Greek and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Description, number of samples, where obtained							U.S. reference quality
	Macedonia 4-S SM 1 3/32" 5 samples from Greece	Macedonia 4-S M 1 3/32" 1 sample from Greece	Central Greece 4-S M 1 3/32" 1 sample from Greece	Thessaly 4-S M to SM 1 3/32" 1 sample from Greece	W. Peloponnesus Acala 4-42 SM 1 1/16" 1 sample from Greece	SM 1 1/8" 2 samples from an import market	SM 1 3/32" 2 samples from an import market	California Acala SJ-1 Mid. White 1-1/8" All 275 samples
Fiber test results:								
Fiber length:								
2.5 percent span . . . . . inches	1.07-1.13	1.15	1.14	1.11	1.11	1.08-1.12	-1.15-	1.09-1.14
Uniformity, 50/2.5 . . . . . percent	46-49	45	48	46	47	-44-	-46-	45-46
Micronaire . . . . . reading	3.9-4.4	3.4	4.1	3.9	4.0	3.0-3.2	3.9-4.1	4.0-4.4
Fiber strength:								
Zero gage . . . . . Mpsi	87-91	85	87	88	85	-88-	82-85	91-104
1/8 inch gage . . . . . gm/tex	23.9-24.6	23.2	24.5	24.6	24.5	24.4-24.5	25.3-26.5	24.7-27.5
Elongation:								
1/8 inch . . . . . percent	5.5-6.0	5.9	6.3	5.9	5.8	6.9-7.0	6.5-6.8	5.0-6.6
Nonlint content . . . . . percent	2.4-2.9	5.0	3.5	2.9	3.2	-3.5-	-2.8-	1.9-3.0
Color, raw cotton:								
Grayness . . . . . number	0-1	1	0	1	1	-1-	-1-	-1-
Yellowness . . . . . number	-4-	3	4	4	4	-4-	-4-	-3-
Composite . . . . . index	103-105	102	105	105	103	-104-	-104-	101-103
Spinning test results:								
Picker & card waste . . . . . percent	4.4-7.0	8.4	7.2	6.5	5.2	6.1-6.4	-5.8-	4.8-5.7
Carded yarn:								
Strength:								
22s. . . . . pounds	124-130	125	131	129	121	127-129	-134-	119-129
50s. . . . . pounds	45-49	46	48	48	45	44-46	-47-	42-48
Elongation:								
22s. . . . . percent	6.8-6.9	7.1	7.5	6.9	7.0	-7.6-	-7.3-	5.0-5.7
50s. . . . . percent	5.2-5.5	5.7	6.0	5.5	5.5	5.8-6.0	-5.7-	3.6-4.8
Appearance:								
22s. . . . . index	120-130	120	130	130	120	110-130	-130-	110-130
50s. . . . . index	90-100	90	100	100	90	90-100	-100-	80-100
Imperfections:								
22s. . . . . number	8-11	16	11	9	17	8-21	-5-	15-29
50s. . . . . number	8-11	12	7	8	13	7-18	-5-	10-25
U.S. classer's grade . . . . . percent of samples								
Middling White	100	--	--	100	100	--	100	(See title)
St. Low Mid. White	--	100	100	--	--	--	--	
Middling Lt. Spotted	--	--	--	--	--	100	--	
U.S. classer's staple length . . . . . percent of samples								
1-3/32"	20	--	--	--	100	50	--	(See title)
1-1/8"	80	--	100	100	--	50	100	
1-5/32"	--	100	--	--	--	--	--	

Standards for Greek cotton, which correspond to but are not precisely identical with the Universal Standards for American Upland Cotton. Staple lengths, which are given in millimeters, also have established equivalents in inches.

According to Greek statistics, 95 percent of Greece's cotton was 28 mm, or 1-3/32", in 1970. As for grade, around half of the crop in both 1969 and 1970 was considered by Greek classers to be Strict Middling White and most of the remainder Strict Middling/Middling White.

Average Micronaire of the 1970-71 crop was 3.88, as based on 4,755 determinations by the Hellenic Cotton Board.

Tests on 13 samples of Greek cotton collected both in Greece and import markets indicated fiber lengths equivalent from 1-1/16" to 1-5/32" in staple lengths with an average of 1-1/8". Micronaires were somewhat lower than in many countries but fiber strengths were high and so were yarn strengths.

Spain

Spain's production in 1971-72 totaled only 190,000 bales compared to over 300,000 bales annually before 1969-70. Spain is a substantial importer of cotton and only about 2,000 bales have been exported annually in recent years. Some 94 percent of the Spanish cotton crop is grown under irrigation. All of the cotton is now Upland with 61 percent of the Carolina Queen variety; 26 percent, Stoneville 213; 8 percent, Rex; and the rest small quantities of other varieties including Acala 442, Yalavera 108-F, 138-F, and Coker 310. Production of Egyptian types ended in 1968-69. The Spanish crop is entirely handpicked and undoubtedly now is entirely saw-ginned.

According to the Centro Algodonero Nacional in Barcelona, the modal grade and staple length of the Spanish crop is Strict Middling White 1-3/32". Typical technical values are:

	Carolina Queen	Stoneville 213
Fiber length:		
2.5 span. . . . . .inches	1.03-1.12	1.02-1.11
50/25 unif . . . . . percent	43-47	44-46
Micronaire, reading.	3.3-4.5	3.6-4.4
Fiber strength:		
1/8" gage. . . .grams tex	22.2-23.2	21.1-22.6
Nonlint content (Shirley Analyzer). . . . . .percent	2.3-4.2	2.5-4.2

Monthly Bulletin, Centro Algodonero Nacional, Barcelona, p. 6.

Table 34.—Grade and staple of cotton grown in Spain 1969-70 and 1970-71 in percent of total

Grade	1969-70	1970-71	Staple length	1969-70	1970-71
White:	*Percent*	*Percent*	*Inches*	*Percent*	*Percent*
Good Middling	6	14	1-3/16	1	1
Strict Middling	34	40	1-5/32	2	9
Middling	32	27	1-1/8	26	24
			1-3/32	44	30
Strict Low Middling.	6	7	1-1/16	18	26
Low Middling	1	--	1-1/32	6	8
Strict Good Ordinary	1	--	1	1	2
Good Ordinary	1	--	31/32	2	--
Light Spotted:					
Good Middling and Strict Middling	5	2			
Middling	11	3			
Other	1	4			
Other:	2	3			
Total	100	100		100	100

Compiled from monthly bulletins of the Centro Algodonero Nacional.

USSR[2]

Production of cotton in the USSR has increased very substantially in recent years, and both in 1970-71 with a total 10.8 million bales and 1971-72 with an estimated 11.1 million bales was the largest of any country. Domestic consumption also has been rising rapidly and in calendar year 1970 totaled 8.0 million bales while exports totaled 2.4 million bales. Of this total, 88 percent was to socialist countries and about half of the remaining 12 percent was to Japan.

The USSR cotton crop is planted in April and May and harvested in September to November. All of the crop is irrigated. Machine picking is increasing and, in 1965, 21 percent of the crop was thus harvested. Evidently some is harvested by stripping because in about 1966 the USSR had 33,000 two-row vertical spindle pickers and 6,000 strippers.[3]

As to ginning, in about 1966 there were 126 state cotton ginning factories, of which five were equipped with roller gins to process long-staple cotton, and the remainder with saw gins to process medium staples. The aggregate annual capacity of the gins in 1966 was 5.6 million metric tons of seed cotton per year and it was reported that it took 9 to 10 months per year to gin an average crop.

Cotton is ginned in all four quarters of the year, with a heavy output in the October-December, January-March, and April-June quarters and a usually lighter output in July-September (tables 35, 36). Since 1955 all of the USSR's cotton has been grown in Central Asia, the Transcaucasian area, and southern Kazakhstan most of it in one Republic, Uzbekistan.

Both Upland (*Gossypium hirsutum*) and Egyptian (*G. barbadense*) varieties are grown in the USSR. The latter, grown in the southern regions of the Uzbek, Tadjik, Turkmenian and Azerbaijan Republics comprised only 7.1 percent of the cotton grown in 1968 while nearly 93 percent was considered to be Upland varieties. Upland variety 108-F was planted to 62 percent of the entire USSR acreage in 1965 and variety C-4727 to an additional 10.6 percent.

In 1969, 76 percent and, in 1970, 80 percent of production was reported to be 1" to 1-3/32" in staple length. All of the rest was 1-1/8" and longer but only 1 percent was listed in 1969 as extra long staple (table 37).

Seed cotton produced in Uzbekistan is purchased from the collective and state farms by the state's Ministry of the Ginning Industry. In other Republics, purchasing is by the Administrations for Cotton Procurement and Ginning of their Ministries of Light Industry. There are 600 seed cotton buying centers in the USSR.

Seed cotton is purchased according to four industrial grades which take account of fiber quality, moisture content, and trash content. The seed cotton is reported to be separated at each procurement center into homogenous lots as to variety, grade, and whether mechanically or handpicked.

Table 35.--Quantity of cotton lint ginned in the USSR by quarters, 1968-71

Quarter	1968	1969	1970	1971[1]
	1,000 bales[2]	*1,000 bales*[2]	*1,000 bales*[2]	*1,000 bales*[2]
Jan. – March	[5,083]	2,200	2,617	3,022
Apr. – June	--	2,425	2,333	2,838
July – Sept	1,318	1,244	1,506	1,575
Oct. – Dec	2,971	2,943	3,315	3,398

Compiled from USSR reports to the International Cotton Advisory Committee.

[1] Total for July 1970 - June 1971, 10,681,000 bales.
[2] 480 lb. net.

[2]Much of the information on quality of USSR cottons is several years old, but is the latest that has come to our attention.

[3]"Cotton Growing and Ginning in the USSR," pp. 5, 6, v/o "Exportljon," Moscow.

Table 36.—Cotton varieties grown in the USSR., 1965

Variety	Percent of acreage	Staple length	
Upland :	*Percent*	*Mm.*	*Inches*
108F	62.5	31.8	1 1/16
C 4727	10.6	31.9	1 1/16
138 F	7.2	35.5	1 3/16
153 F	3.7	32.0	1 1/16 -1 3/32
149 F	3.4	34.6	1 5/32
2421	2.2	31.3	1 1/16
Others	1.1	--	--
Total	92.1	--	--
Barbadense :			
5904 E	2.6	35.8	1 3/16
9078 E	1.7	38.8	1 7/16
5595 V	1.9	37.4	1 1/4
Others	1.1		
Total	7.3	--	--
Grand total	100.0	--	--

Compiled from "Cotton Growing and Ginning in the USSR.," published by V/O "Exportljon," Moscow.

Table 37.—Production of cotton in the USSR, 1968-70

Item	Calendar years		
	1968	1969	1970
Seed cotton:	*1,000 metric tons*	*1,000 metric tons*	*1,000 metric tons*
Uzbek SSR	4,011	3,861	4,668
Turkman SSR	712	692	868
Tajik SSR	642	626	727
Azerbaijan SSR	333	299	335
Kirghiz SSR	177	140	187
Kazakh SSR	70	90	105
Total	5,945	5,708	6,890
Lint cotton:			
Total	2,034	1,921	2,128
	1,000 bales[1]	*1,000 bales*[1]	*1,000 bales*[1]
Total	9,372	8,812	8,771
Staple lengths:			
Upland varieties:	*Percent*	*Percent*	*Percent*
1" to 1 3/32"	77.8	75.5	80.3
1 1/8" and longer	15.1		
Barbadense varieties:		23.5	19.7
1 1/8" to 1 5/16"	2.0		
1 3/8" and longer	5.1	1.0	--
Total	100.0	100.0	100.0

As reported in annual reports of USSR., to International Cotton Advisory Committee. 1969, 1970, and 1971. Lint cotton figures are apparently ginnings which do not necessarily correspond with total production figures for a crop year.

[1] 480 lb. net.

Lint cotton is classed and graded according to USSR State Standard 3279-51 into two groups, Upland and *G. barbadense*, each into seven grades, all according to four technical tests of quality: for fiber strength, maturity, trash, and moisture (table 38). The tests are made by taking samples of 100 grams (0.22 lb.) from about an inch under the surface of the cotton in each tenth bale. A number of samples are then mixed so as to obtain an average sample of 100 grams which is then tested. As the instruments and methods are much different from those in the United States, comparisons with U.S. technical data on cotton have not been made in this study.

The first element in determining the grade—fiber strength—is calculated as the breaking load per single fiber in tests in which there is a 3 mm. space between jaws of the dynanometer.

Second element in determining grade—is determined by microscopic examination of 250 fibers in which the fibers are classed into 11 groups according to maturity, ranging from 5.0 for absolutely mature down to 0.0 for absolutely immature. The ratio of the width of the fiber to the thickness of the canal is stated as characterizing the maturity of the fiber.

The third element of grade—defects and trash content—includes the percentage of cotton with "convolutions, strings, conjoint defects, motes, broken seeds and dead fiber." In case of dispute, defects and impurities are actually picked out by hand with tweezers.

The fourth element is moisture content.

It is reported that if a lot of Pervyi-I grade cotton is found to have 2.4-percent defects and trash instead of the allowable 2.1 percent, the invoice weight will be reduced by 0.3 percent. In other words, adjustments for defects and trash are made very much as is done elsewhere for moisture content.

Color is not taken into account in determining quality. Provided a shipment meets the fixed specifications for tensile strength, maturity, defects, trash, and moisture content it can be delivered spotted, tinged, creamy, or even blue. However, taking into account the Western concept of classification, the Russians strive not to deliver any other cotton than white against contracts of Otbornyi (Extra) and Pervyi-I.[4]

Table 38.—Characteristics of industrial grades of lint cotton in the USSR

Grade	Fiber breaking strength[1]	Maturity index[2]	Defects and trash content[3]	Moisture content
	Grams	*Index*	*Percent*	*Percent*
Otbornyi - Extra	4.9 and over	2.1 and over	1.9	8
Pervyi - I	4.4 - 4.8	2.0	2.1	8
Vtorny- II	3.9 - 4.3	1.8	2.6	9
Tretyi - III	3.4 - 3.8	1.6	3.5	10
Tchevertyi - IV	3.0 - 3.3	1.4	5.3	11
Pyatyi - V	2.5 - 2.9	1.2	8.6	12
Sheshtoy - VI				
XB 6 XO 6 XH 6	Less than 2.5	Less than 1.2	12.5	12

Compiled from "Cotton Growing and Ginning in the U.S.S.R." published by v/o "Exportljon," Moscow.

[1] Average breaking strength per individual fiber.

[2] As determined by microscopic examination of fibers to determine number of individual fibers that are mature, half mature, immature, or dead. 5.0 indicates absolute maturity, fibers 0.0 indicates absolute immaturity.

[3] Percentage of cotton with "convolutions, strings, conjoint defects, motes, broken seeds, dead fibre," as well as "hulls, hull fibres, fine trash and neps." Estimated by using Shirley Analyzer but in case of dispute, defects and impurities are picked out with tweezers, according to a Western European source.

[4] Based on memorandum from Western European source.

Apparently the USSR, like the United States, classifies cotton both by grade and by staple length. A typical quotation is for Pervyi 31/32 mm. cotton. Pervyi-I grade accounted for at least half of the USSR's cotton production in 1960-61-1964-65 because according to Western sources Otbornyi (Extra) is scarce.

Another 20 percent was Vtoroy-II cotton. As for staple lengths, more than half was 31/32 mm. and another fifth to a sixth each year was 32/33 mm. (table 39). Regretably, more recent grade and staple data have not come to our attention.

Relationships between U.S. and USSR staple lengths and grades, according to Soviet sources, are given in table 40. The grade comparisons raise a question because U.S. standard samples are prepared for visual comparison and tests on such "biscuits" might give rise to misleading results. Also, the Russian figures for trash content of U.S. cotton do not seem to agree with U.S. sources. Tests performed over the years in the United States indicate that Strict Low Middling has a 3.0 percent nonlint content compared to 6 percent for what is said to be the USSR equivalent of this grade. As for Good Ordinary, U.S. figures give 6.7 percent; while the Russian figure is 20 percent.

As indicated by the foregoing data, Pervyi-I 31/32 mm. is the leading USSR cotton quality, and this is the quality largely sold in the Western European market. Results of tests on 12 samples of this quality indicated staple lengths ranging from 1-1/32" to 1-3/32" with the average 1-1/16" (tables 41, 42). The samples produced picker and card waste ranging from what would be considered typical for U.S. Strict Middling to below Low Middling with the average around Strict Low Middling. Yarn strength was average and yarn imperfections low to average.

The samples of the lower grades of USSR cotton had low Micronaires, 2.5 to 2.8, and 16 to 20 percent noncotton content.

Table 39.—Grade and staple length of the USSR cotton crop

Item	1960-61/1964-65 average	1964-65
Grades:	*Percent*	*Percent*
O, I	55.8	47.7
II	21.2	23.1
III	6.0	7.5
IV	4.0	5.0
V	5.2	7.0
VI	7.8	9.7
Total	100.0	100.0
Staple lengths:		
Under 30/31 mm	1.3	.6
30/31	11.4	6.3
31/32	56.3	58.5
32/33	17.6	22.1
33/34	1.3	.7
34/35	4.8	3.9
Over 34/35	7.3	7.9
Total	100.0	100.0

Compiled from "Cotton Growing and Ginning in the USSR.," published by v/o "Exportljon," Moscow, p. 16. See table 40 for U.S. grade and staple length equivalent according to this USSR source.

Table 40.–Soviet equivalents of U.S. standards for staple lengths and grades

Staple lengths[1]		Grades[2]		
U.S. standard	Soviet standard	U.S. standard White cotton	Corresponding grade of Soviet cotton	
			Grade	Trash content
Inches	*Mm.*			*Percent*
15/16	27/28	Good Middling	I	1.5
31/32	28/29	Strict Middling	II	2.6
1	29/30	Middling	II	3.2
1 1/32	30/31	Strict Low Mid.	III	6.0
1 1/16	31/32	Low Middling	IV	10.0
1 3/32	32/33	Strict Good Ordinary	IV	15.0
1 1/8	33/34	Good Ordinary	V	20.0
1 5/32	34/35			
1 3/16	35/36			
1 7/32	36/37			
1 1/4	37/38			
1 7/16	39/40			
1 1/2	40/41			

[1] Based on instrument fiber tests.

[2] Established by "comparing standard samples of white lint cotton of U.S. standards issued in 1956 with standard samples of Soviet lint cotton of USSR standard 32.79-46 and grade characteristics as specified by USSR Standard 3279-51". From pp. 31, 32, "Cotton Growing and Ginning in the U.S.S.R.," v/o "Exportljon," Moscow.

Table 41.--Fiber and spinning test results on samples of specified USSR and U.S. cottons and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained		2 U.S. reference qualities	
	Pervyi - I 31/32 mm. 12 samples from import markets		Mississippi SLM White 1-3/32" All 350 samples	Arizona DPL SLM White 1-1/16" All 175 samples
	Average results	Range results	Range results	
Fiber test results:				
Fiber length:				
2.5 percent span ..... inches	1.05	1.03-1.08	1.07-1.14	1.02-1.14
Uniformity, 50/2.5..... percent	48	47-50	41-46	43-45
Micronaire ..... reading	4.8	4.2-5.0	3.9-4.9	3.9-5.0
Fiber strength:				
Zero gage..... Mpsi	79	77-82	78-87	83-91
1/8 inch gage ..... gm/tex	23.0	22.6-23.5	22.1-24.8	22.7-25.3
Elongation:				
1/8 inch..... percent	7.2	6.9-7.7	5.4-7.0	6.0-7.5
Nonlint content ..... percent	4.5	2.9-6.2	2.6-3.8	2.7-3.6
Color, raw cotton:				
Grayness ..... number	0	0-1	1-3	1-3
Yellowness ..... number	4	3-5	1-3	2-3
Composite ..... index	105	103-107	95-102	94-101
Spinning test results:				
Picker & card waste..... percent	6.0	4.1-7.4	5.5-7.1	5.7-6.8
Carded yarn:				
Strength:				
22s ..... pounds	110	101-116	102-112	97-116
50s ..... pounds	39	37-42	32-41	32-41
Elongation:				
22s ..... percent	7.2	6.9-7.7	6.3-7.7	5.0-6.0
50s ..... percent	6.1	5.4-6.5	4.8-6.0	3.7-4.5
Appearance:				
22s ..... index	111	90-130	90-110	100-120
50s ..... index	92	70-100	70-90	70-100
Imperfections:				
22s ..... number	18	7-31	11-24	18-37
50s ..... number	13	5-23	9-24	16-28
U.S. classer's grade ..... percent of samples				
Middling White.....	--	92	(See title)	(See title)
Middling Lt. Spot.....	--	8		
U.S. classer's staple length ..... percent of samples				
1-1/16"	--	75	(See title)	(See title)
1-3/32"	--	25		

Table 42.—Average of fiber and spinning test results on samples of specified USSR and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained					A U.S. reference quality
	Victory II	Tchetvertyi IV	Pyatyi V	Shestoy XB 6	Shestoy XC 6	Texas 1" all grades Under 4.0 micronaire
	1 sample from an import market	2 samples from an import market	2 samples from an import market	2 samples from an import market	2 samples from an import market	All 150 samples
Fiber test results:						
Fiber length:						
2.5 percent span ..... inches	1.03	-1.08-	1.00-1.01	.99-1.00	.99-1.00	.99-1.03
Uniformity, 50/2.5 ..... percent	44	45-46	-40-	-40-	39-40	45-48
Micronaire ..... reading	4.1	3.1-3.3	2.7-2.8	-2.6-	2.5-2.6	3.2-3.8
Fiber strength:						
Zero gage ..... Mpsi	78	72-73	71-75	73-75	74-77	83-88
1/8 inch gage ..... gm/tex	22.8	21.0-21.5	19.7-20.1	19.6-20.8	21.1-23.2	21.6-23.0
Elongation:						
1/8 inch ..... percent	6.6	8.3-8.5	7.0-7.3	7.2-7.5	6.9-7.5	5.9-7.2
Nonlint content ..... percent	7.0	6.2-8.1	-16.0-	17.0-19.7	-16.2-	2.9-4.5
Color, raw cotton:						
Grayness ..... number	0	2-3	-4-	5-6	-6-	2-3
Yellowness ..... number	4	-5-	-4-	-6-	-6-	3-4
Composite ..... index	104	96-99	-89-	79-81	-80-	95-99
Spinning test results:						
Picker & card waste ..... percent	8.7	5.5-6.1	-10.5-	12.1-13.5	-14.0-	5.7-7.5
Carded yarn:						
Strength:						
8s ..... pounds	--	--	-305-	289-300	-298-	332-340
22s ..... pounds	109	103-107	-92-	87-89	-88-	100-113
50s ..... pounds	36	36-38	--	--	--	--
Elongation:						
8s ..... percent	--	--	-7.4-	7.4-7.7	-6.9-	--
22s ..... percent	6.9	8.0-8.5	-6.9-	-6.6-	-6.1-	6.5-6.8
50s ..... percent	5.5	6.5-6.7	--	--	--	6.1-6.3
Appearance:						
8s ..... index	--	--	-60-	-60-	-60-	120-130
22s ..... index	110	-100-	-60-	-60-	-60-	80-120
50s ..... index	80	-70-	--	--	--	--
Imperfections:						
8s ..... number	--	--	-24-	22-33	-29-	47-61
22s ..... number	27	29-33	-19-	17-22	-20-	25-65
50s ..... number	29	20-28	--	--	--	--
U.S. Classer's grade ..... percent of samples						
Middling	100	--	--	--	--	40
SLM	--	--	--	--	--	20
LM	--	--	--	--	--	--
M. Lt. Sp.	--	--	100	--	--	--
SLM Lt. Sp.	--	50	--	--	--	--
LM Lt. Sp.	--	50	--	--	--	--
LM Sp.	--	--	--	50	--	--
BG	--	--	--	50	100	40
U.S. Classer's staple length ... percent of samples						
1"	--	--	100	100	--	--
1-1/32"	100	--	--	--	--	(See title)
1-1/16"	--	100	--	--	--	

ASIA

India

Production of cotton in India totaled over 5.8 million bales in 1971-72 compared to 4.6 million bales in 1970-71 and 4.7 million bales the season before that. Consumption of cotton in India, which currently runs about 5.3 million bales a year, is usually in excess of production, but this was not true in 1971-72. India does find it necessary, however, to import substantial quantities of long and extra-long staple cotton and, on the other hand, usually exports some of its shorter staple cotton, notably of the Bengal Desi variety, which is not needed in India. Exports totaled 148,000 bales in 1970-71 and are expected to total 269,000 bales in 1971-72.

About 13 percent of India's cotton acreage, the largest in the world, is irrigated. The rest is rain-grown and yields are relatively low. All of the cotton is handpicked and 98 percent is roller-ginned.

India's cotton is predominantly under 1" in staple length although production of over 1" cotton is gradually increasing. Bengal Desi, the principal export variety, has a Micronaire of as high as 7.8 or 7.9 but a staple length of below 3/4". Such cotton is shorter in staple length and has a higher Micronaire than any cotton grown in the United States. Other leading varieties from the viewpoint of production are L-147, Jarila, and Digvijay, all of which are usually in the 13/16" to 31/32" group. Some of the shorter staple cotton grown in Texas and Oklahoma is comparable in staple length.

Tests on samples of Indian cotton collected for this survey indicated high picker and card waste percentages and large numbers of yarn defects. Some of the samples, however, had quite long fiber lengths.

Table 43—Commercial production of cotton in India, by varieties and regions, 1969-70

Variety	Staple length	States					
		Punjab Haryana Rajasthan	Maharashtra Madya Pradesh	Gujarat	Andhra Pradesh, Mysore Tamil Nadu	Other	Total
	Inches	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]
Andrews, ISC-67	1-1/32-1-6/32	--	--	86	2	--	88
Hybrid-4 (170-CO2)	15/16-1-1/32	--	51	287	9	--	347
Cambodia & Uganda	29/32-1-1/32	--	--	--	163	--	163
320F	13/16-7/8	510	--	--	--	--	510
Other American seed	25/32-13/16	77	--	--	--	14	91
L-147/CT1/A51-9 (Buri)	27/32-31/32	--	918	--	14	--	932
Gaorani 6 & 12	13/16-7/8	--	69	--	6	--	75
AK/197-31 (Jarila)	13/16-7/8	7	577	--	3	--	587
Digvijay	13/16-29/32	6	2	551	--	--	559
Kalyan, V-797	25/32-27/32	--	--	257	--	--	257
CJ-73, Sanjay	25/32-27/32	--	2	64	--	--	66
Wagad, Kalagin, Mathio	23/32-25/32	--	--	65	--	--	65
Laxmi	13/16-15/16	--	56	--	229	--	285
Jayadhar, Farm	26/32-29/32	--	--	--	136	--	136
Karungannies, Laxmi	13/16-30/32	--	--	--	74	--	74
Bengal Desi	--	404	--	--	--	4	408
All other	--	48	--	--	37	7	92
Total	--	1,052	1,675	1,310	673	25	4,735

[1] 480 lb. net.

Table 44.–Minimum and maximum fiber and spinning test results on samples of specified Indian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained					U.S. reference quality
	L147 4 samples from India	Cambodia 2 samples from India	Digvijay 4 samples from India	Laxmi 4 samples from India	Bengal Desi 4 samples from India	Texas 29/32" All 150 samples
Fiber test results:						
Fiber length:						
2.5 percent span ..... inches	1.01-1.11	1.11-1.20	.94-.97	.83-.92	.63-.72	.87-.90
Uniformity, 50/2.5 ..... percent	43-48	45-47	47-52	43-46	48-53	43-47
Micronaire ..... reading	3.9-4.4	3.6-4.7	3.9-4.6	3.5-3.8	7.1-7.5	3.5-5.2
Fiber strength:						
Zero gage ..... Mpsi	87-98	-82-	91-100	91-94	78-86	84-93
1/8 inch gage ..... gm/tex	20.7-24.5	21.5-22.4	27.2-30.4	19.6-23.1	--	18.8-22.5
Elongation:						
1/8 inch ..... percent	4.0-5.5	6.7-6.8	4.3-4.4	4.7-5.1	--	6.0-6.7
Nonlint content..... percent	5.4-7.8	6.5-7.8	4.9-5.1	5.8-14.7	4.4-9.7	2.7-3.9
Color, raw cotton:						
Grayness ..... number	2-3	2-3	1-2	2-6	2-4	3-5
Yellowness ..... number	4-5	4-5	3-4	5-6	4-5	4-6
Composite ..... index	97-100	95-99	99-104	77-98	91-98	88-96
Spinning test results:						
Picker & card waste..... percent	11.0-14.4	10.2-11.7	6.9-7.5	9.2-21.8	(1)	5.6-7.2
Carded yarn:						
Strength:						
8s ..... pounds	--	--	336-356	240-323	(1)	250-350
22s ..... pounds	86-114	110-127	102-109	65-97	(1)	73-105
50s..... pounds	28-40	39-48	--	--	(1)	--
Elongation:						
8s ..... percent	--	--	5.3-5.6	4.5-6.0	(1)	5.4-7.2
22s ..... percent	4.8-6.1	6.8-7.3	4.8-5.0	4.0-5.7	(1)	4.5-6.1
50s ..... percent	3.8-4.8	5.4-6.1	--	--	(1)	--
Appearance:						
8s ..... index	--	--	120-130	110	(1)	110-120
22s ..... index	90	90-130	110-120	90-100	(1)	100-120
50s ..... index	70-80	70-110	--	--	(1)	--
Imperfections:						
8s ..... number	--	--	49-64	68-93	(1)	38-68
22s ..... number	29-37	8-20	28-36	40-56	(1)	26-36
50s ..... number	26-31	4-19	--	--	(1)	--
U.S. classer's grade ..... percent of samples:						
Strict Low Mid	--	--	--	--	--	(2)
Strict Low Mid Light Spot	50	100	75	50	--	(2)
Low Mid Light Spot	50	--	25	25	100	(2)
Below Grade	--	--	--	25	--	(2)
U.S. classer's staple length .... percent of samples						
1-5/32".....	25	50	--	--	--	(2)
1-1/16"	25	50	--	--	--	(2)
1-1/32"	50	--	--	--	--	(2)
31/32"	--	--	100	25	--	(2)
15/16"	--	--	--	50	--	(2)
7/8".....	--	--	--	25	--	(2)
3/4".....	--	--	--	--	100	(2)

[1] Too short in staple to spin. [2] See title.

Iran

Production of cotton in Iran is expected to total 665,000 bales in 1971-72 compared to 707,000 bales in 1970-71 and a peak of 770,000 bales in 1968-69. Domestic consumption has been gradually rising and in 1971-72 accounted for about 325,000 bales. Exports totaled 451,000 bales during 1969-70 and 482,000 bales in 1970-71, and are expected to decline to about 340,000 bales in 1971-72.

About 70 percent of Iran's cotton acreage is under irrigation. Eighty percent of the cotton acreage is on the Caspian coast and in this region around 60 percent of the acreage is irrigated. Elsewhere in Iran all of the cotton land is irrigated.

All Iranian cotton is handpicked and saw-ginned. More than one-half of the cotton ginning is done by exporters. Iran's cotton is harvested from September through December.

Upland cottons, all derived from U.S. varieties, account for 98 percent of the crop. Around 92 percent is Coker 100 Wilt and other strains of Coker including all of the cotton on the Caspian coast, but this cotton is reported to have an average staple length of 1-1/16" on the Caspian coast and 1-1/32" elsewhere. Acala 1517C comprises another 5 percent of the crop but in Iran it is said to staple only 1-1/32". Production of Filistani, originally a Weber variety from the United States that was introduced in 1925, is declining and now constitutes only 1 percent of the crop. It has an average staple length of only about 1".

The other 2 percent of the cotton crop is of the Bonni variety, a short, harsh Asiatic cotton with a staple length variously reported at 1/2" to 13/16" and with Micronaires of 5.0 to 7.0. Almost all is used by the village handloom industry. Experiments are being conducted with Giza 31, a long staple Egyptian variety, and plans are to grow it on a new irrigation project near the USSR border.

New cotton grading standards, said to be comparable to U.S. Official Universal Standards, were to be put into operation in 1970-71.

It has been reported that about 70 percent of Iran's cotton is Strict Middling 1-1/16" but information is very fragmentary. Some of the European markets consider that much of the cotton is now 1-3/32".

Tests on five samples of Iranian cotton obtained in importing markets indicated fiber lengths ranging from the equivalent of 1-1/32" staple length to 1-1/8" with the average 1-1/16". Most of the samples produced about the same amount of picker and card waste and yarn of the same strength as Texas Middling Light Spotted 1-1/32" cotton, but averaged lower than the latter in yarn imperfections. Of course there were not enough samples to know whether the results were representative or not.

Table 45.—Minimum and maximum fiber and spinning test results on samples of specified Iranian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Description, number of samples, where obtained		U.S. reference quality
	Mid. to St. Mid. 1-3/32" 1 sample from an import market	SLM 1-1/16" 4 samples from an import market	Texas Mid. Lt. Spot 1-1/32" All 75 samples
Fiber test results:			
Fiber length:			
2.5 percent span ..... inches	1.14	1.03-1.08	1.05-1.07
Uniformity, 50/2.5 ..... percent	47	45-46	44-47
Micronaire..... reading	3.9	4.0-4.2	3.6-4.4
Fiber strength:			
Zero gage.....Mpsi	77	78-81	84-95
1/8 inch gage..... gm/tex	23.7	21.1-24.2	22.3-24.0
Elongation:			
1/8 inch..... percent	6.6	6.8-7.5	5.1-6.7
Nonlint content..... percent	6.3	4.4-4.9	3.3-4.2
Color, raw cotton:			
Grayness ..... number	1	2-3	2-4
Yellowness ..... number	5	3-5	-4-
Composite..... index	103	93-97	89-97
Spinning test results:			
Picker & card waste..... percent	12.1	7.6-8.4	6.3-7.9
Carded yarn:			
Strength:			
22s ..... pounds	123	98-113	99-113
50s ..... pounds	44	33-40	33-41
Elongation:			
22s ..... percent	7.3	6.7-7.2	5.3-6.2
50s ..... percent	6.0	5.4-5.9	3.9-4.8
Appearance:			
22s ..... index	120	100-110	80-120
50s ..... index	100	80-90	70-100
Imperfections:			
22s .....number	8	19-33	32-54
50s .....number	9	15-22	24-47
U.S. classer's grade ..... percent of samples			
SLM White.....	--	50	(See
M Light Spot.....	100	--	title)
SLM Light Spot.....	--	25	
M Spot.....	--	25	
U.S. classer's staple length ..... percent of samples			
1-1/16"	--	50	(See
1-3/32"	--	50	title)
1-1/8"	100	--	

Pakistan

Production of cotton in Pakistan totaled between 2.4 million and 2.5 million bales in the three seasons 1968-69, 1969-70, and 1970-71, but increased to 3,250,000 bales in 1971-72. Consumption now totals around 1.6 million bales a year while exports were 579,000 bales in 1968-69, 405,000 bales in 1969-70 and 453,000 bales in 1970-71 (table 46).

Pakistan produces two types of cotton, Desi (*Gossypium arboreum*) and Upland, or American cotton (*G. hirsutum*). In 1971-72, at least 150,000 bales were Desi cotton and 3 million bales were Upland.

Around 90 percent of Pakistan's cotton acreage, including all of the Upland cotton acreage, is irrigated. All of the cotton is handpicked and half is roller-ginned and the other half is saw-ginned. The cotton is picked from September to January.

Technical characteristics of Pakistan cotton, according to publications of the Pakistan Central Cotton Committee, are given in tables 47, 48, 49. Upland varieties in Pakistan are mostly 15/16" to 1" in staple length with a modal Micronaire of 4.6 to 5.0 and a quite high fiber strength. Nearly all of the Upland crop was reported to have a Pressley strength of 80,000 to 90,000 pounds per square inch and over. As indicated, Pakistan's most important variety quantitatively is AC-134 and the next most important is NT, which is the trade name for two varieties, M4 and M100.

Desi cotton is unusual in that its staple length is only 3/8" to 5/8" but with the fibers so coarse that Micronaire readings range from 7.0 to 11.0. This type of cotton is not produced in the United States. The shortest staple cotton produced in the United States in quantity is 29/32", and this cotton has Micronaire readings, as would be expected from Upland variety cotton, ranging from about 3.5 to around 5.2.

Results of fiber and spinning tests on 43 samples of Pakistan cotton show that AC-134 and NT cotton, both Uplands, had fiber lengths varying from about 31/32" to 1-1/32" (tables 50, 51). Fiber strengths were quite high. Some of the samples produced yarn with few imperfections, others were quite high in this regard. This cotton might be compared to Texas Strict Low Middling Light Spot 1" cotton.

Table 46.—Production and exports of Upland cotton in Pakistan by varieties, year beginning September 1

Season	Desi	4F	LSS	NT	289 F	AC 134	Total
Production:	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]
1969-70	87	43	269	570	223	1,301	2,493
1970-71	106	29	251	617	260	1,299	2,562
1971-72[2]:							
Sind	61	--	--	735	--	--	796
Sahiwall	25	--	--	--	--	653	678
Lyallpur	--	--	327	--	--	41	368
Multon	--	--	--	--	--	751	751
Bahawalpur	61	25	--	--	334	74	494
Total	147	25	327	735	334	1,519	3,087
Exports:							
1968-69	100	--	479	--	--	--	579
1969-70	81	--	324	--	--	--	405
1970-71, Sept-July:							
Roller-ginned	89	5	91	58	18	24	285
Saw ginned	--	--	--	32	40	96	168
Total	89	5	91	90	58	120	453

[1] 480 lb. net.

[2] March 1972 estimate. Compiled from Monthly Cotton Review of the Pakistan Central Cotton Committee.

Table 47.—Production of cotton in Pakistan by staple lengths, 1968-71

Season beginning Sept. 1	Under 13/16"	13/16" - 1"	1-1/32" 1-3/32"	1-1/8" 1-5/16"	Total
	1,000 bales[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]
1968-69	243	2,358	368	5	2,974
1969-70	232	2,401	375	20	3,028
1970-71	213	2,475	400	25	3,113

Pakistan statement, International Cotton Advisoty Committee Proceedings 1971, p. 179.
[1] 392 lb. net.

Table 48.—Technical characteristics of Pakistan cottons

Variety	Staple length	Micronaire	Tensile strength	Maturity (Causticare)
	Inches	*Reading*	*1,000 lbs. per. square inch*	*Index*
Desi:				
231 R (Punjab)	1/2 -5/8	7.0 - 9.0	--	84 - 92
T.D. 1 (Sind)	3/8 - 5/8	7.5 - 10.5	--	85 - 94
Comilla (E.Pak.)	3/8 - 1/2	8.0 - 11.0	--	86 - 94
Upland:				
L.S.S. (Punjab)	27/32-15/16	4.5 - 5.5	80 - 90	78 - 86
L 11 (Punjab)	15/16-1-1/16	4.5 - 5.5	- 90 -	76 - 84
AC 134 (Punjab)	15/16-1-1/16	4.0 - 5.0	90 - 95	76 - 84
BS 1 (13/36 (Punjab).....	15/16-1-1/16	4.0 - 5.0	85 - 105	--
4 F (Punjab)	3/4 - 7/8	5.0 - 6.0	80 - 90	78 - 90
M 4 (Sind), M 100 (Sind)	15/16 - 1	4.0 - 5.0	- 85 -	75 - 82
MS 39, MS 40 (Punjab)	1-1-1/4	4.3 - 4.5	90 - 95	--

Note: M4 and M 100 are both known as NT.
Compiled from Pakistan report in International Cotton Advisory Committee Proceedings, 1971, p. 178.

Table 49.—Staple length, Micronaire, and Pressley fiber strength of Upland cotton varieties grown in Pakistan, 1967-68 crop[1]

Item	AC 134	NT	124 F (289F)	LSS	4 F	All varieties
No of samples	198	199	42	74	10	523
Staple length (inches):	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Under 27/32"	--	--	--	12	10	2
27/32 - 7/8	--	1	2	48	10	7
7/8 - 29/32	6	5	--	27	--	8
29/32 - 15/16	12	18	--	8	--	13
15/16- 31/32	18	37	12	4	--	23
31/32 - 1	42	34	64	--	20	35
1 - 1-1/32	18	5	22	1	--	11
1-1/32 - 1-1/16	3	--	--	--	--	1
1-1/16 and over	1	--	--	--	--	--
Total	100	100	100	100	100	100
Micronaire (readings):						
3.6 - 4.0	2	8	--	1	--	4
4.1 - 4.5	27	46	10	14	--	30
4.6 - 5.0	54	39	59	50	40	48
5.1 - 5.5	16	7	24	24	30	15
5.6 - 6.0	1	--	7	11	30	3
Total	100	100	100	100	100	100
Pressley strength (Mpsi):						
81 - 85	2	--	2	34	--	6
86 - 90	41	34	24	53	60	39
91 - 95	31	61	34	12	40	40
96 - 100	26	5	40[1]	1	--	15
Total	100	100	100	100	100	100

Compiled from "Report on Quality Characteristics of Pakistan Cottons," 1967-68, Pakistan Central Cotton Committee, Karachi, June 1970.

[1] Including 2 percent 101 - 105.

Table 50.—Minimum and maximum fiber and spinning test results on samples of specified Pakistan and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	AC 134 Roller-ginned 4 samples from Karachi	AC 134 Roller-ginned 4 samples from import markets	AC 134 Saw-ginned 6 samples from Karachi	AC 134 Saw-ginned 7 samples from import markets	NT Roller-ginned 2 samples from an import market	NT Saw-ginned 2 samples from Karachi	NT Saw-ginned 2 samples from an import market	A U.S. reference quality: Texas St. L. Mid. Lt. Spot 1" All 175 samples
Fiber test results:								
Fiber length:								
2.5 percent span ..... inches	.95-1.00	.96-.99	.96-1.04	.96-1.01	1.00-1.01	.95-1.00	.96-1.00	.98-1.01
Uniformity, 50/2.5 ..... percent	44-49	43-49	45-47	45-48	46-48	46-48	45-47	45-48
Micronaire ..... reading	3.2-5.2	4.3-5.3	4.1-4.9	4.5-5.2	5.1-5.3	4.6-4.9	5.0-5.1	4.3-4.8
Fiber strength:								
Zero gage ..... Mpsi	86-102	95-98	94-98	88-101	93-97	88-93	95-98	90-97
1/8 inch gage ..... gm/tex	21.6-27.0	21.2-23.9	23.8-25.8	20.8-26.2	21.4-22.7	22.3	21.2-24.0	21.8-24.1
Elongation:								
1/8 inch ..... percent	4.9-5.4	4.3-5.2	4.5-4.9	4.4-5.1	5.1-5.3	5.0-5.1	4.5-5.2	5.3-6.2
Nonlint content ..... percent	5.7-16.5	8.5-11.5	7.7-9.5	6.2-10.3	7.7-9.4	6.0-6.6	8.2-9.4	3.3-5.0
Color, raw cotton:								
Grayness ..... number	3-5	3	3-4	2-3	3-4	3	2-3	3-5
Yellowness ..... number	4	4	4	3-4	4	4	4-5	4-5
Composite ..... index	84-96	92-93	90-97	94-98	89-92	92-96	92-99	89-93
Spinning test results:								
Picker & card waste ..... percent	10.7-17.4	9.3	11.1-13.9	9.1-12.0	(1)	8.7-8.8	10.2-12.5	6.3-7.5
Carded yarn:								
Strength:								
8s ..... pounds	323-344	335	352-364	340-352	(1)	298-327	297-345	318-337
22s ..... pounds	91-109	104	99-116	107-111	(1)	94-104	90-106	96-105
50s ..... pounds	32-34	--	37-40	--	(1)	--	--	--
Elongation:								
8s ..... percent	5.6-5.8	5.9	5.9-6.3	6.0-6.5	(1)	6.2-6.3	5.6-6.3	6.3-6.4
22s ..... percent	4.6-5.5	5.4	4.8-5.5	5.5-5.7	(1)	5.0-5.5	5.1-5.7	5.0-5.7
50s ..... percent	4.2-5.3	--	4.1-4.8	--	(1)	--	--	--
Appearance:								
8s ..... index	120	130	120-130	120-130	(1)	130	120-130	120-130
22s ..... index	70-120	120	90-120	110-125	(1)	130	110-120	100-120
50s ..... index	60-90	--	80	--	(1)	--	--	--
Imperfections:								
8s ..... number	71-72	1	46-65	1-4	(1)	36-42	2-3	25-36
22s ..... number	38-57	1	22-30	1-2	(1)	20-23	1-2	17-40
50s ..... number	27-54	--	20-27	--	(1)	--	--	--
U.S. classer's grade ..... percent of samples								
Strict Low Middling White	--	--	--	--	--	--	--	(2)
Middling Light Spot	--	--	--	--	--	--	--	(2)
Strict Low Middling Light Spot ...	--	100	--	100	--	50	50	(2)
Low Middling Light Spot	25	--	100	--	--	50	--	(2)
Middling Spotted	--	--	--	--	--	--	--	(2)
Strict Low Middling Spotted ...	25	--	--	--	--	--	--	(2)
Low Middling Spotted	50	--	--	--	--	--	50	(2)
U.S. Classers' Staple Length: ..... percent of samples								
3/4"	--	--	--	--	--	--	--	(2)
7/8" - 15/16"	50	--	--	--	--	50	--	(2)
31/32"	--	--	--	100	--	50	50	(2)
1"	--	100	33	--	--	--	50	(2)
1-1/32"	50	--	67	--	--	--	--	(2)

[1] Samples too small for spinning tests. [2] See title.

Table 51.–Minimum and Maximum fiber and spinning test results on samples of specified Pakistan and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	LSS Roller-ginned 4 samples from Karachi	LSS Roller-ginned 2 samples from an import market	Sind Desi 4 samples from Karachi	Punjab Desi 6 samples from import markets	U.S. reference quality
					Texas 29/32 All 150 samples
Fiber test results:					
Fiber length:					
2.5 percent span ..... inches	.86-.91	.86-.88	.65-.74	.64-.66	.87-.90
Uniformity, 50/2.5... percent	48-52	- 49 -	46-50	50-52	43-47
Micronaire ..... reading	4.7-5.7	- 5.5 -	6.0-7.4	6.8-7.1	3.5-5.2
Fiber strength:					
Zero gage ..... Mpsi	89-93	87-89	75-80	70-78	84-93
1/8 inch gage..... gm/tex	19.4-21.9	19.3-20.1	14.9-17.6	--	18.8-22.5
Elongation:					
1/8 inch .....percent	4.3-5.8	5.2-5.3	5.3-5.7	--	6.0-6.7
Nonlint content .....percent	8.3-9.2	8.7-10.2	4.7-6.3	10.0-10.9	2.7-3.9
Color, raw cotton:					
Grayness ..... number	3-4	- 2 -	- 4	4-5	3-5
Yellowness ..... number	4-5	- 4 -	4-5	- 5 -	4-6
Composite ..... index	90-94	97-98	87-90	84-88	88-96
Spinning test results:					
Picker & card waste ..... percent	10.3-15.0	(1)	(2)	14.5-15.2	5.6-7.2
Carded yarn:					
Strength:					
8s ..... pounds	267-295	(1)	(2)	105-124	250-350
22s ..... pounds	84-88	(1)	(2)	21-22	73-105
50s ..... pounds	--	(1)	(2)	--	--
Elongation:					
8s .....percent	5.4-5.8	(1)	(2)	6.7-7.3	5.4-7.2
22s ..... percent	4.6-5.2	(1)	(2)	5.6-7.0	4.5-6.1
50s ..... percent	--	(1)	(2)	--	--
Appearance:					
8s ..... index	120-130	(1)	(2)	60-90	110-120
22s..... index	- 120 -	(1)	(2)	60-90	100-120
50s ..... index	--	(1)	(2)	--	--
Imperfections:					
8s .....number	48-55	(1)	(2)	2-4	38-68
22s .....number	25-31	(1)	(2)	2-3	26-36
50s .....number	--	(1)	(2)	--	--
U.S. classer's grade ..... percent of samples					
Strict Low Middling White ...	--	--	--	--	17
Middling Light Spot	--	--	--	--	33
Low Middling Light Spot	50	--	--	--	17
Middling Spot	--	--	--	--	33
Low Middling Spot	50	--	--	100	--
U.S. Classer's Staple Length ..... percent of samples					
3/4"	--	--	--	100	--
7/8"	50	--	--	--	--
1"	25	--	--	--	--
1-1/32".....	25	--	--	--	--

[1] Samples too small for spinning tests. [2] Staple length too short to spin.

Syria

Production of cotton in Syria totaled 697,000 bales in 1970-71 and 715,000 bales in 1971-72. Consumption takes 135,000 bales each season. Exports totaled 617,000 bales in 1970-71, and may total 580,000 bales in 1971-72.

Some 12 percent of the cotton acreage was rain-grown in 1971-72. Thus the bulk of Syria's cotton is irrigated. All of the cotton is handpicked. Approximately 80 percent was saw-ginned in 1970-71 compared to 40 percent in 1964-65. The remainder is roller-ginned. The crop is picked from August 15 into December but half of the crop is not ginned until the end of December and ginning is not completed until after March 31.

Carolina Queen had completely replaced Coker 100-A by 1969-70 following the import of substantial tonnages of seed from the United States for this purpose over several years. However, a new variety, Aleppo I developed in Syria, was to occupy 40 percent of the acreage in 1972 and it is predicted that it will cover the entire area in 1973. Some experiments also are being conducted with Acala SJ1. According to Syrian statistics, Syrian cotton is now largely 1-3/32" in staple length with some 1-1/16" and some 1-1/8".

The Cotton Marketing Organization of the Government of Syria is the sole buyer of seed cotton from the farmers; the organization gins the cotton, and sells it in world and local markets. Bales are sampled twice, once by the Cotton Bureau and once by the Cotton Marketing Organization. The Cotton Bureau classes cotton both for grade and staple length. "O" grade is the base grade and is said to be approximately equivalent to U.S. Middling Shy White. "O/X" grade is considered to be Middling leaf and Strict Middling Color. Grade "1" is equivalent to Strict Low Middling, Very Light Spotted, and Grade 2 to Low Middling Very Light Spotted. There are separate standards for both saw-ginned and roller-ginned cotton but the statistics given in table 52 are for both types of cotton. As indicated, around three-fourths of Syria's cotton now staples 1-3/32". "O/X" is the most important grade.

Table 52.—Grade and staple length of cotton grown in Syria, 1970-71 and 1971-72

Staple length and year		Grade								
		O/X	0	1/0	1	2/1	2	3/2	3	Total
		1,000 bales[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]
1"	1969-70	2	--	--	--	--	--	--	--	2
	1970-71	--	--	--	--	--	--	--	--	--
1-1/32"	1969-70	11	1	--	--	--	--	--	--	12
	1970-71	4	--	--	--	--	--	--	--	4
1-1/16"	1969-70	56	11	11	4	8	8	5	1	104
	1970-71	93	15	5	--	2	--	--	--	115
1-3/32"	1969-70	138	107	132	64	98	7	4	--	550
	1970-71	336	99	51	3	1	--	--	--	490
1-1/8"	1969-70	24	17	4	1	--	--	--	--	46
	1970-71	47	30	6	--	--	--	--	--	83
1-5/32"	1969-70	--	--	--	--	--	--	--	--	--
	1970-71	2	1	--	--	--	--	--	--	3
Total	1969-70	231	136	147	69	106	15	9	1	[3] 718
	1970-71	482	145	62	3	3	--	--	--	[4] 697

Compiled from half monthly reports of Cotton Bureau, Syrian Arab Republic, Aleppo.

[1] 480 lb. net.
[2] For reported U.S. grade equivalents, see text.
[3] Includes 4,000 bales of Scarto and "CBM" not included in breakdown.
[4] Includes 2,000 bales of Scarto and "CBM" not included in breakdown.

Test data were for only 3 samples of Syrian cotton, and the data are not for the principal quality. The Standard O 1-1/8" saw-ginned samples did have a fiber length equal to 1-1/8" cotton and U.S. classers rated one sample Strict Middling White and the other Middling White. Both, however, had more nonlint content and picker and card waste than would be thought typical of these grades in the United States.

Table 53.--Minimum and maximum fiber and spinning test results on samples of specified Syrian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Description, number of samples and where obtained		U.S. reference qualities	
	Standard O Saw Gin. 1-1/8" 2 samples from an import market	Standard O Saw Gin. 1-1/16" 1 sample from an import market	South-Central All SLM Wh. 1-1/8" 80 samples	Calif. Acala SJ1 M 1-1/8" All 275 samples
Fiber test results:				
Fiber length:				
2.5 percent span . . . . . inches	1.12-1.13	1.07	1.12-1.14	1.09-1.14
Uniformity, 50/2.5 . . . . . percent	-46-	44	42-45	45-46
Micronaire . . . . . reading	4.1-4.3	4.0	3.7-4.4	4.0-4.4
Fiber strength:				
Zero gage . . . . . Mpsi	80-81	82	80-86	91-104
1/8 inch gage . . . . . gm/tex	22.3-22.7	22.1	22.6-24.6	24.7-27.5
Elongation:				
1/8 inch . . . . . percent	6.2-6.5	5.6	6.1-6.6	5.0-6.6
Nonlint content . . . . . percent	3.0-3.5	4.6	2.5-3.9	1.9-3.0
Color, raw cotton:				
Grayness . . . . . number	0-1	1	1-2	-1-
Yellowness . . . . . number	-4-	4	1-3	-3-
Composite . . . . . index	104-105	104	96-103	101-103
Spinning test results:				
Picker & card waste . . . . . percent	6.5-7.2	6.1	5.3-6.8	4.8-5.7
Carded yarn:				
Strength:				
22s. . . . . pounds	116-117	108	95-120	119-129
50s. . . . . pounds	-41-	38	32-42	42-48
Elongation:				
22s. . . . . percent	6.7-6.9	6.8	6.1-7.4	5.0-5.7
50s. . . . . percent	5.4-5.7	5.6	4.7-6.2	3.6-4.8
Appearance:				
22s. . . . . index	120-130	110	80-110	110-130
50s. . . . . index	-110-	80	70-80	80-100
Imperfections:				
22s. . . . . number	6-9	26	12-33	15-29
50s. . . . . number	4-9	22	10-28	10-25
U.S. classer's grade . . . . . percent of samples				
Strict Mid. White	50	--	(See title)	(See title)
Middling White	50	100		
U.S. classer's staple length . . . . . percent of samples				
1-3/32"	--	100	(See title)	(See title)
1-1/8"	100	--		

Table 55.—Classification of cotton grown in Turkey, according to Turkish official standards

Standard	Roller-ginned[1]				Saw-ginned	
	Aegean and Antalya regions		Cukurova region		Cukurova and Antalya regions	
	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71
White:	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Extra	0.1	--	2.9	2.3	10.4	13.2
1	65.3	43.5	64.7	82.6	50.2	63.1
2	6.9	13.4	10.7	6.0	25.0	17.1
3	1.5	3.5	.3	(2)	2.0	(2)
4 - 6	--	(2)	--	(2)	--	--
Light spotted:						
1	15.8	22.5	14.8	6.2	5.9	2.1
2	7.4	13.2	6.2	2.5	4.7	4.1
3	2.3	2.9	.4	(2)	.7	.9
4 - 5	.4	(2)	--	--	--	--
Colored 1 - 5	--	(2)	--	--	1.1	(2)
Other	.3	(2)	--	(2)	--	--
Total	100.0	100.0	100.0	100.0	100.0	100.0

[1] Practically all of the cotton grown in the Aegean, the bulk of the cotton grown in Antalya, and about 50 percent of the cotton grown in the Cukurova area is roller-ginned. The remainder in the Cukurova and Antalya areas is saw-ginned. See table 54 for production in each area.

[2] Less than 0.5 percent.

Aegean area. White No. 2 is also important as is White Extra in the saw-ginned classification and No. 1 and No. 2 Light Spotted in the roller-ginned groups.

Results of tests and classers' determinations on 44 samples of Turkish cotton (tables 56, 57, 58) indicate that the roller-ginned Aegean samples had fiber lengths equivalent to 1-3/32" through 1-5/32" with 1-1/8" the average. Pressley fiber strengths were 79,000-86,000 pounds per square inch. In general the samples appeared to produce yarn comparable to 1-1/8" cotton from south-central USA, but the Turkish samples produced more waste than almost any grade available in quantity in the United States.

Two of the Cukurova roller-ginned samples had a staple length of only an inch, but the other samples had fiber lengths equivalent to staple lengths of 1-3/32" to 1-1/8". Yarn strengths and yarn appearances were mostly comparable to what would be expected from U.S. Southwest Low Middling White 1-1/16", but the picker and card waste percentages were in excess of what would be expected from U.S. Good Ordinary.

The samples of Turkish saw-ginned cotton had fiber lengths ranging all the way from 1" to 1-1/8" cotton. Picker and card waste produced ranged from 6.3 to 12.2 percent. The yarn strength and appearance were roughly comparable to what would be expected from such a description as U.S. Southwest Strict Low Middling Light Spotted 1-1/32", but yarn imperfections were lower.

Table 56.–Minimum and maximum fiber and spinning test results on samples of specified Turkish roller-ginned cottons and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained						U.S. reference qualities	
	Standard I-White roller-ginned 4 samples from Turkey	Standard I-White roller-ginned 7 samples from import markets	Standard II-White roller-ginned 4 samples from Turkey	Standard II-White roller-ginned 3 samples from an import market	Standard I - LtSpot roller-ginned 2 samples from Turkey	Standard II-LtSpot roller-ginned 2 samples from Turkey	South Central SLM White 1 1/8" All 100 samples	South Central Coker 310 All 150 samples
Fiber test results:								
Fiber length:								
2.5 percent span . . . . . inches	1.11-1.17	1.07-1.14	1.12-1.15	1.10-1.12	1.15-1.17	-1.16-	1.12-1.14	1.13-1.20
Uniformity, 50/2.5 . . . . percent	44-47	45-47	45-47	46-47	45-46	42-47	42-45	41-44
Micronaire . . . . . reading	4.2-4.6	4.0-4.6	3.9-4.3	3.9-4.4	-4.7-	3.3-4.1	3.7-4.4	4.2-4.9
Fiber strength:								
Zero gage . . . . . Mpsi	82-84	79-82	79-86	83-86	82-84	79-82	80-86	82-86
1/8 inch gage . . . . . gm/tex	23.0-24.7	22.1-23.4	22.4-23.7	22.2-23.3	22.2-22.3	21.1-21.8	22.6-24.6	22.6-24.8
Elongation :								
1/8 inch . . . . . percent	5.8-6.7	6.1-6.9	5.7-6.1	6.1-6.5	5.9-6.0	6.2-6.3	6.1-6.6	4.7-5.6
Nonlint content . . . . . percent	4.1-6.8	5.6-8.4	7.6-9.0	7.1-8.0	4.7-4.8	5.6-8.9	2.5-2.9	3.9-5.0
Color, raw cotton:								
Grayness . . . . . number	0-2	1-2	2-3	-1-	-1-	1-3	1-2	2-4
Yellowness . . . . . number	3-4	-5-	-3-	-4-	-3-	2-3	1-3	2-4
Composite . . . . . index	100-104	100-103	91-99	101-102	103-104	91-101	96-103	88-96
Spinning test results:								
Picker & card waste . . . . . percent	11.1-11.7	7.4-12.8	13.8-15.4	13.3-14.1	11.7-11.8	13.2-15.9	5.3-6.8	8.7-9.6
Carded yarn :								
Strength:								
22s. . . . . pounds	99-122	109-116	109-111	95-108	-112-	105-109	95-120	90-115
50s. . . . . pounds	32-43	28-39	38-39	-35-	39-41	37-38	32-43	28-42
Elongation :								
22s. . . . . percent	6.0-6.6	6.6-7.0	6.2-6.5	-6.6-	6.6-6.7	6.5-7.2	6.1-7.4	5.2-6.7
50s. . . . . percent	4.4-5.4	5.2-5.7	5.0-5.2	4.8-5.0	4.9-5.5	5.1-5.5	4.7-6.2	3.8-5.1
Appearance :								
22s. . . . . index	90-120	110-120	100-110	-110-	-110-	-100-	80-110	80-110
50s. . . . . index	60-90	70-100	80-90	90-100	80-90	70-80	70-80	70-80
Imperfections:								
22s. . . . . number	16-38	11-25	-26-	12-15	14-18	28-36	12-33	22-29
50s. . . . . number	10-28	15-19	19-22	14-17	12-14	22-29	10-28	15-22
U.S. classer's grade . . . . . percent of samples								
M White	25	--	--	--	50	--	(See title)	--
SLM White	75	--	--	--	50	50		--
LM White	--	--	100	--	--	50		67
M Light Spotted	--	70	--	33	--	--		--
SLM Light Spotted	--	30	--	67	--	--		17
LM Light Spotted	--	--	--	--	--	--		17
U.S. classer's staple length . . . . . percent of samples								
1-1/8"	75	70	25	--	50	50	(See title)	67
1-5/32"	25	30	75	100	50	50		33

Table 57.–Minimum and maximum fiber and spinning test results on samples of specified roller ginned Turkish cotton and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained				U.S. reference qualities	
	Roller ginned Standard Extra 2 samples from importing countries	Roller ginned Standard 1 2 samples from Turkey	Roller ginned Standard I 2 samples from importing countries	Roller ginned Standard II 4 samples from Turkey	Southwest Low Mid. White 1-1/16" All 125 samples	Texas St. L. Mid. White 1" All 175 samples
Fiber test results:						
Fiber length:						
2.5 percent span ..... inches	.98-.99	-1.13-	-1.09-	1.08-1.10	1.07-1.10	.98-1.01
Uniformity, 50/2.5 ..... percent	46-47	47-48	44-46	45-47	44-47	45-48
Micronaire ..... reading	4.0-4.1	4.4-4.5	4.2-4.3	4.1-4.3	4.1-4.9	4.3-4.8
Fiber strength:						
Zero gage ..... Mpsi	76-78	80-82	77-78	77-79	78-87	90-97
1/8 inch gage ..... gm/tex	21.5-21.8	22.1-22.6	21.6-21.8	21.4-23.0	21.5-22.9	21.8-24.1
Elongation:						
1/8 inch ..... percent	6.9-7.1	6.7-6.8	6.4-6.5	6.4-7.3	5.5-6.6	5.3-6.2
Nonlint content ..... percent	-10.6-	-7.3-	8.1-11.1	8.6-9.0	3.6-4.3	3.3-5.0
Color, raw cotton:						
Grayness ..... number	-2-	-2-	-3-	2-3	3-4	3-5
Yellowness ..... number	-5-	-3-	-4-	-3-	2-3	4-5
Composite ..... index	-101-	-97-	93-96	94-96	88-95	89-93
Spinning test results:						
Picker & card waste ..... percent	-9.3-	-13.2-	10.9-11.2	14.8-10.5	6.0-7.8	6.3-7.5
Carded yarn:						
Strength:						
8s ..... pounds	-331-	--	--	--	--	318-337
22s ..... pounds	-101-	-109-	102-103	-101-	95-106	96-105
50s ..... pounds	--	-38-	35-36	--	32-39	29-33
Elongation:						
8s ..... percent	-7.2-	--	--	--	--	--
22s ..... percent	-6.5-	-7.1-	7.1-7.2	-6.5-	5.4-6.4	5.0-5.7
50s ..... percent	--	-5.4-	-5.4-	5.5-6.8	3.9-4.7	3.2-3.6
Appearance:						
8s ..... index	-110-	--	--	--	--	--
22s ..... index	-100-	-120-	90-100	90-120	110-120	100-120
50s ..... index	--	-100-	70-80	80-90	80-100	80-90
Imperfections:						
8s ..... number	-5-	--	--	--	--	--
22s ..... number	-3-	-15-	27-36	23-27	17-37	26-38
50s ..... number	--	-15-	26-31	20-24	13-24	21-29
U.S. classer's grade.. percent of samples						
Low Mid. White	--	100	--	100	(See	(See
St. Low Mid. Lt. Spot	100	--	50	--	above)	above)
Low Mid. Lt. Spot	--	--	50	--		
U.S. classer's staple length percent of samples						
1"	100	--	--	--	(See	(See
1-1/32"	--	--	--	--	above)	above)
1-1/16"	--	--	100	--		
1-3/32"	--	--	--	50		
1-1/8"	--	100	--	50		

Table 58.–Minimum and maximum fiber and spinning test results on samples of specified saw-ginned Turkish cottons and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained						U.S. reference qualities	
	Saw ginned Standard Extra 2 samples from Turkey	Saw ginned Standard Extra 1 sample from an importing county	Saw ginned Standard I 4 samples from Turkey	Saw ginned Standard II 2 samples from Turkey	Saw ginned Standard II 1 sample from an importing country	Standard I 1-1/32" 2 samples from an importing country	Southwest SLM LtSpot 1-1/32" All 75 samples	Arizona DPL M 1-3/32" All 150 samples
Fiber test results:								
Fiber length:								
2.5 percent span . . . . . inches	1.00-1.02	1.04	1.02-1.13	1.11-1.13	1.08	1.03-1.04	1.05-1.07	1.07-1.13
Uniformity, 50/2.5 . . . . percent	44-45	45	45-48	-46-	42	-46-	44-47	43-45
Micronaire . . . . . reading	3.7-3.8	4.3	4.0-4.2	-4.0-	3.9	-3.9-	3.6-4.4	3.6-5.0
Fiber strength:								
Zero gage . . . . . Mpsi	-80-	80	74-81	78-79	82	-77-	84-95	82-86
1/8 inch gage . . . . . gm/tex	21.2-22.1	21.4	21.6-23.1	22.8-24.2	21.2	-21.9-	22.3-24.0	22.6-23.8
Elongation:								
1/8 inch . . . . . percent	6.3-6.6	7.1	6.6-6.8	6.1-6.7	6.9	-7.2-	5.1-6.7	7.0-8.1
Nonlint content . . . . . percent	2.3-2.5	3.1	3.9-4.1	-6.6-	5.0	-9.6-	3.3-4.3	2.2-3.6
Color, raw cotton:								
Grayness . . . . . number	-0-	1	0-1	-2-	2	-2-	2-4	1-2
Yellowness . . . . . number	-5-	4	3-4	-4-	3	-5-	-4-	2-3
Composite . . . . . index	107-108	104	104-105	-98-	96	-100-	89-97	99-103
Spinning test results:								
Picker & Card waste . . . . . percent	-	6.3	6.8-9.6	-12.2-	6.3	-10.6	6.3-7.9	4.5-6.8
Carded yarn:								
Strength:								
8s . . . . . pounds	-	-	-	-	-	325	-	-
22s . . . . . pounds	-	105	101-113	-116-	104	-100-	99-113	100-123
50s . . . . . pounds	-	37	36-42	-41-	37	-	33-41	36-45
Elongation:								
8s . . . . . percent	-	-	-	-	-	-7.3-	-	-
22s . . . . . percent	-	6.9	7.3-7.7	-7.4-	7.0	-6.4-	5.3-6.2	5.7-6.4
50s . . . . . percent	-	5.8	5.8-6.2	-5.8-	5.7	-	3.9-4.8	4.3-5.2
Appearance:								
8s . . . . . index	-	-	-	-	-	100	80-120	-
22s . . . . . index	-	100	110-120	-120-	100	-100-	80-120	90-120
50s . . . . . index	-	90	80-90	-90-	80	-	70-100	70-100
Imperfections:								
8s . . . . . number	-	-	-	-	-	-4-	-	-
22s . . . . . number	-	17	17-20	-16-	19	-3-	32-54	18-39
50s . . . . . number	-	17	14-17	-23-	17	-	24-47	12-28
U.S. classer's grade . . . . . percent of samples								
Strict Mid. White.	50	-	-	-	-	-	(See title)	(See title)
Middling White	50	-	50	-	-	-		
Strict Low Mid. White	-	-	50	100	100	-		
Mid. Light Spotted	-	100	-	-	-	-		
Strict L. Mid LtSpot.	-	-	-	-	-	100		
U.S. classer's staple length . . . . . percent of samples								
1-1/32"	100	-	25	-	-	100	(See title)	(See title)
1-1/16"	-	100	-	-	-	-		
1-3/32"	-	-	25	-	100	-		
1-1/8"	-	-	50	100	-	-		

AFRICA

Egypt

Egypt is one of the largest producers of cotton in the world, with a crop estimated at 2.2 million bales in 1971-72, which figure was also the average of the previous eight seasons. Domestic consumption has been increasing over the years and now is in excess of 900,000 bales annually. Exports have been running around 1.4 million bales annually.

Egypt is notable for production of extra-long staple and long staple varieties. Staple lengths are in excess of all but a few bales of the U.S. Upland crop but U.S. Pima cotton is in the same staple length range as some of the Egyptian ELS varieties. All of Egypt's cotton is irrigated, handpicked, and roller-ginned.

Egypt's cotton varieties range in staple length from Ashmouni with a staple length of 1-1/4" to Giza 45 with a staple length as high as 1-9/16". Very little of the shorter staple Egyptian, however, is exported.

Results of tests on samples of UAR cotton indicate that Giza 45 and Giza 68 produced 50s and 80s combed yarns that were stronger than U.S. Pima yarn while Menoufi was about equal and Giza 69 and Giza 67 were not quite as good. Yarn defects were low and roughly comparable, and both the Egyptian and U.S. Pima produced about the same amount of picker and card, and comber waste.

Table 59.—Production and exports of cotton, by varieties, Egypt, 1969-70 and 1970-71

Variety	Production		Exports	
	1969-70	1970-71	1969-70	1970-71
Extra-long staples:	*1,000 bales*	*1,000 bales*	*1,000 bales*	*1,000 bales*
Menoufi	449	511	386	452
Giza 45	106	125	110	117
Giza 68	355	359	250	288
Others	1	2	2	0
Total	911	997	748	857
Long staples:				
Dendera	182	143	81	2
Giza 67	421	334	395	286
Giza 69	264	258	205	195
Total	867	735	681	483
Medium staples:				
Ashmouni	237	195	(1)	(1)
Giza 66	422	360	19	30
Total	659	555	19	30
Scarto	60	59	21	33
Grand total	2,497	2,346	1,469	1,403

[1] As reported.

Table 60.—Technical characteristics of Egyptian cotton

Item	Color	Staple length		Micronaire		Pressley fiber strength		Yarn strength		
								60s carded		120s combed
		1969-70	1970-71	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71	1970-71
Giza 45	White	*Inches*	*Inches*	*Index*	*Index*	*Mpsi*	*Mpsi*	*Lb.*	*Lb.*	*Lb.*
FG		1-18/32	1-18/32	3.1	3.3	118	118	51	50	21
Good		1-17/32	1-16/32	3.0	3.2	112	112	48	47	20
Giza 68	Medium									
FG.	to	1-15/32	1-14/32	3.3	3.3	111	112	46	46	18
Good	White	1-13/32	1-13/32	2.9	3.1	109	110	44	44	17
Menoufi	Dark									
FG.		1-17/32	1-16/32	3.6	3.6	110	107	45	43	17
Good		1-15/32	1-14/32	3.4	3.4	108	106	43	43	17
Giza 69	White									
FG		1-12/32	1-12/32	3.8	4.2	105	104	38	37	--
Good		1-11/32	1-11/32	3.7	3.9	102	--	35	34	--
Giza 67	Medium									
FG.	to	1-13/32	1-12/32	4.5	4.4	101	101	35	34	--
Good	White	1-12/32	1-11/32	4.0	4.2	99	98	34	32	--
Dendera	Dark									
G/FG		1-10/32	1-10/32	4.4	3.7	99	99	31	31	--
Good		1-9/32	1-8/32	4.4	3.3	98	97	30	30	--
Giza 66	Dark									
G/FG		1-10/32	1-10/32	4.4	4.6	96	97	31	31	--
Good		1-9/32	1-9/32	4.4	4.5	94	95	30	30	--
Ashmouni	Brown									
G/FG		1-8/32	1-8/32	4.6	4.8	95	95	28	27	--
Good		1-8/32	1-8/32	4.3	4.6	93	94	27	26	--

Compiled from report of Cotton Technology Research Division, Ministry of Agriculture of Egypt.

Table 61.—Minimum and maximum fiber and spinning test results on samples of specified Egyptian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained					U.S. reference quality
	Giza 45 2 samples from an importing market	Giza 68 4 samples from import markets	Menoufi 5 samples from import markets	Giza 69 4 samples from import markets	Giza 67 4 samples from import markets	Pima All grades and staple lengths All 450 samples
Fiber test results:						
Array length:						
Upper quartile inch . . . . inches	1.40-1.56	1.33-1.40	1.38-1.54	1.26-1.29	1.30-1.35	1.42-1.56
Coefficient of variation . . percent	30-32	29-30	26-33	29-35	29-33	28-32
Micronaire . . . . . reading	-3.2-	3.2-3.5	3.4-4.0	4.0-4.5	4.2-4.4	2.8-4.0
Fiber strength:						
Zero gage . . . . . Mpsi	107-112	102-109	100-104	97-100	99-104	94-104
1/8 inch gage . . . . . gm/tex	39.3-39.5	34.7-38.4	33.8-35.6	32.1-34.4	31.4-32.6	31.5-36.0
Elongation:						
1/8 inch . . . . . percent	7.0-7.1	6.4-7.3	7.2-7.9	6.2-7.1	6.6-7.7	5.9-7.6
Nonlint content . . . . . percent	2.2-2.4	2.0-2.6	1.9-3.0	2.1-3.0	2.6-3.2	2.1-5.5
Color, raw cotton:						
Grayness . . . . . number	1-2	3-4	-4-	1-3	-3-	3-5
Yellowness . . . . . number	-5-	-6-	6-7	4-5	5-7	5-6
Composite . . . . . index	102-104	92-96	88-93	94-104	93-96	85-93
Spinning test results:						
Picker & card waste . . . . . percent	8.0-8.6	7.4-9.7	8.0-8.7	7.8-9.9	9.0-9.4	6.7-10.3
Comber waste . . . . . percent	16.4-19.4	17.0-19.1	17.2-18.8	17.4-20.8	20.7-22.3	15.0-20.6
Combed yarn:						
Strength:						
50s. . . . . pounds	77-81	73-76	68-74	56-64	57-58	69-73
80s. . . . . pounds	43-46	40-42	37-40	30-34	29-30	36-38
Elongation:						
50s. . . . . percent	-5.9-	6.0-6.2	5.5-6.2	5.3-5.4	5.1-5.3	6.0-6.7
80s. . . . . percent	5.0-5.1	5.1-5.4	4.9-5.3	4.8-5.0	4.4-4.5	4.9-5.7
Appearance:						
50s. . . . . index	100-110	110-120	110-120	120-130	110-120	110-120
80s. . . . . index	-100-	110-120	110-120	-120-	110-120	110-120
Imperfections:						
50s. . . . . number	-4-	2-5	2-3	1-2	1-2	2-6
80s. . . . . number	-3-	2-4	1-3	1-2	1-2	1-6
U.S. classer's grade . . . . . percent of samples						
Grade 1	50	--	--	--	--	--
Grade 2	50	25	40	--	--	--
Grade 3	--	50	60	75	100	61
Grade 4	--	25	--	25	--	39
U.S. classer's staple length . . . . . percent of samples						
1-3/16"	--	--	--	25	--	--
1-1/4"	--	--	--	25	50	--
1-5/16"	--	75	--	50	50	--
1-3/8"	50	25	60	--	--	50
1-7/16"	--	--	40	--	--	50
1-1/2"	50	--	--	--	--	--

Franc Zone countries

Production of cotton in the Franc Zone countries in Africa as estimated in January 1972 may have totaled 779,000 bales in 1971-72. The great bulk of this cotton is exported, although domestic consumption is gradually rising. This cotton is now mostly in the 1-1/32" - 1-3/32" staple length bracket but between 60,000 to 85,000 bales annually may be 1" or under.

All of the cotton grown in the countries in this group, with the exception of a few thousand bales in Malagasy, is rain-grown. All is handpicked and saw-ginned. The cotton is harvested generally from October into January, and most in November and December. An exception is Madagascar where much of the production of over 25,000 bales is harvested in May-July.

The Institut de Recherches du Coton et des Textiles Exotiques conducts a program to breed improved varieties of cotton in central and western Africa. Variety BJA 592 was developed in 1963 from selections and crossings tracing back to such Upland varieties as Triumph, Allen, and Stoneville 2B. It now is being widely cultivated in the Central African Republic, Chad, Cameroon, Upper Volta, Mali, Senegal, and Dahomey, and covered about 1.1 million acres in 1971-72. This variety staples 1" to 1-3/32" depending on location and other factors, has a Micronaire of 4.0 to 4.6, and is reported to have decided agronomic advantages and a high ginning lint turnout averaging 37 percent.

The other leading variety is HG-9 which accounted for 32 percent of the acreage in Franc Zone Africa including 80 percent in Chad. 444/2, HL-1, and Mono are the other current varieties. The latter, grown in Dahomey and Togo, is a coarse, shorter staple *barbadense* variety.

Table 62.—Production of cotton in specified African Franc Zone countries, 1971-72

Country	Acreage	Percent of acreage by varieties		Production
	1,000 acres	*Percent*		*1,000 bales*
Chad	791	20	BJA	180.0
		80	HG-9	
Central African Rep	309	85	BJA	85.3
		15	B-50	
Cameroon	247	100	BJA	92.0
Upper Volta	222	90	BJA	51.6
		10	444-2	
Malawi	161	100	BJA	107.4
Dahomey	131	20	BJA	88.5
		15	HG-9	
		65	Allen 333	
Ivory Coast	124	100	444-2	77.4
Senegal	49	100	BJA	30.4
Madagascar	30	20	Stoneville 7A	34.1
		13	Acala 1517-BR	
		67	Acala 1517-C	
Togo	27	80	Allen 333	14.0
		20	Mono	
Niger	25	100	HL-1	17.9
All countries	2,116	53	BJA	778.6
		32	HG-9	
		7	444-2	
		5	A-333	
		2	B-50	
		1	HL-1	
		(1)	Mono	

Institut de Recherches du Coton et des Textiles Exotiques, Paris, January 1972.

[1] Less than 0.5 percent.

In this study, tests were made on 28 samples of Franc Zone cotton. Most of the samples were described as "first quality" but it is not known how much of the various crops would be so described. As indicated, the samples ranged in staple length from aromnd 1-1/16" to 1-1/8", in Micronaires from 3.9 to 4.6, and in Pressley strengths from 80,000 to 92,000 pounds. U.S. official classers considered the samples to be largely Middling and Strict Middling White and Light Spotted.

There was a wide range in results as to yarn appearance and yarn imperfections. Many of the samples appeared to produce yarn comparable in strength and appearance to Texas SLM White 1-1/16", 3.8 - 4.2 Micronaire.

Table 63.—Technical characteristics of cotton varieties grown in African Franc Zone countries

Variety	Staple length	Fibrograph 2.5% span length	Micronaire	Fiber strength	
				Zero gage	1/8" gage
	Inches	*Mm.*	*Reading*	*Mpsi*	*gm/tex*
BJA	1 - 1-3/32	27 - 29	3,9 - 4,6	20 - 21	85 - 92
HG-9	1 - 1-3/32	27 - 29	3,8 - 4,4	19 - 21	82 - 89
444-2	1 - 1-3/32	27 - 29	3,7 - 4,2	20 - 23	85 - 91
A333-61	1 - 1-3/32	26 - 29	3,8 - 4,3	19 - 21	81 - 89
HL-1	1 - 1-3/32	27 - 29	3,8 - 4,2	19 - 21	84 - 88
Mono	1 - 1-3/32	27 - 29	4,0 - 4,8	20 - 23	87 - 94

Institut de Recherches du Coton et des Textiles Exotiques, Paris, January 1972.

Table 64.—Minimum and maximum fiber and spinning test results on samples of specified Franc Zone countries and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Description, number of samples, where obtained					Two U.S. reference qualities	
	Chad BJA 1st quality 6 samples from an import market	Chad HG 9 1st quality 6 samples from an import market	Central Afric. Rep. BJA 6 samples from an import market	Cameroon 1st quality (1) 8 samples from import markets	Mali Abidjan St'd 2Z 1-1/32" 2 samples from an import market	Mississippi SLM White 1-3/32" All 375 samples	Texas SLM White 1-1/16" 3.8-4.2 micronaire All 225 samples
Fiber test results:							
Fiber length:							
2.5 percent span . . . . . inches	1.13-1.14	1.04-1.07	1.08-1.10	1.05-1.06	1.05-1.09	1.07-1.14	1.04-1.13
Uniformity, 50/2.5 . . . . percent	48-49	44-45	47-48	43-46	45-46	41-46	43-47
Micronaire . . . . . reading	4.4-4.6	4.0-4.1	4.1-4.3	3.9-4.3	-4.1-	3.9-4.9	3.8-4.2
Fiber strength:							
Zero gage . . . . . Mpsi	80-85	82-87	80-85	83-92	81-82	78-87	82-93
1/8 inch gage . . . . . gm/tex	23.1-23.8	20.1-21.1	21.6-22.3	20.9-24.2	22.1-22.2	22.1-24.8	21.9-25.1
Elongation:							
1/8 inch . . . . . percent	5.9-6.1	4.6-4.9	5.4-6.0	5.0-5.3	5.4-5.5	5.4-7.0	5.5-7.2
Nonlint content . . . . . percent	2.8-3.0	2.7-3.0	1.8-2.4	3.2-4.5	2.9-3.8	2.6-3.8	2.1-3.0
Color, raw cotton:							
Grayness . . . . . number	-1-	-2-	-1-	2-3	-3-	1-3	2-3
Yellowness . . . . . number	-4-	-6-	-4-	5-6	5-6	1-3	2-4
Composite . . . . . index	101-102	99-100	102-103	96-99	-96-	95-102	95-100
Spinning test results:							
Picker & card waste . . . . . percent	7.5-8.0	5.3-6.2	5.0-6.8	4.8-7.6	6.4-6.5	5.5-7.1	4.7-6.5
Carded yarn:							
Strength:							
22s. . . . . pounds	116-120	104-112	115-117	109-111	111-116	102-112	106-124
50s. . . . . pounds	39-42	38-42	37-41	38-40	40-42	32-41	39-42
Elongation:							
22s. . . . . percent	6.6-6.9	6.1-7.0	6.9-7.2	6.4-7.0	-6.8-	6.3-7.7	5.4-6.6
50s. . . . . percent	5.0-5.5	5.0-6.0	5.1-5.9	5.1-5.7	5.3-5.5	4.8-6.0	4.2-4.8
Appearance:							
22s. . . . . index	-130-	100-110	120-130	90-110	90-110	90-110	100-120
50s. . . . . index	-110-	90-100	-110-	70-90	80-90	70-90	80-100
Imperfections:							
22s. . . . . number	8-12	14-24	5-8	19-37	30-35	11-24	16-39
50s. . . . . number	7-12	11-20	4-7	20-22	-25-	9-24	11-35
U.S. classer's grade . . . . . percent of samples							
Middling White	--	--	100	--	--		
St. Mid. Lt. Spot.	--	50	--	--	50		
Middling Lt. Spot	100	--	--	88	--	(See title)	(See title)
Strict Mid. Spot	--	50	--	--	--		
Middling Spot	--	--	--	12	50		
U.S. classer's staple length . . . . . percent of samples							
1-1/32"	--	--	--	12	--		
1-1/16"	--	83	--	88	50	(See title)	(See title)
1-3/32"	--	17	83	--	50		
1-1/8"	100	--	17	--	--		

[1] Two samples are Dania, SLM 1 1/32".

Nigeria

Nigeria had a record cotton crop of 420,000 bales during 1969-70 but production declined to 182,000 bales in 1970-71 and 175,000 bales in 1971-72 owing to the early ending of rains and dissatisfaction with cotton prices compared to returns from food crops. Cotton consumption has been gradually rising and totaled 243,000 bales in 1970-71. Exports totaled 89,000 bales in 1969-70 and 191,000 bales in 1970-71, but probably they will not exceed 30,000 bales in 1971-72.

Practically all of Nigeria's cotton is rain-grown and is produced in the north. However, experiments are being conducted with irrigated cotton. All of the cotton is handpicked and saw-ginned. Nigerian cotton is harvested from about October into February but sometimes ginning continues until July or August.

Until 1968 the principal variety was Samarv 26J, a derivative tracing back to some Allen variety American Upland cotton imported in 1912. Currently Samarv 69 and 70, said to be the last of the straight Allen line to be grown, are being used but will be replaced by hybrids in the future.

Nigerian cotton in the past has been in the 15/16" to 1-1/16" staple length range but with only 10 or 15 percent exceeding 1". Demand for longer staple cotton from domestic mills has led to planting of some longer staple cotton with production of perhaps 12,000 bales of 1-3/32" and 1-1/8" cotton in 1970.

All seed cotton is purchased from farmers by licensed buying agents for the various state marketing boards. The British Cotton Growing Association gins the cotton on a fee basis, after which the marketing boards sell to the local spinning mills or to the Nigerian Produce Marketing Company. The latter is the sole agency with authority to sell cotton for export.

Standards for Nigerian cotton are prepared by a cotton concern in Liverpool that specializes in Nigerian cotton. The Nigerian grades are reported to be approximately equivalent to USA grades as follows:

NA 1 .... Strict Middling/Good Middling
NA 2 .... Strict Middling/Very Light Spotted
NA 3 .... Middling/Strict Middling Light Spotted

The following suffixes are added to the grade designations to indicate staple lengths:

A++ ... 1-3/32"
A+ .... 1-1/16"
A ..... 1-1/32" to 1-1/16"
B ..... 1" to 1-1/32"
C ..... 31/32" to 1"
D ....., Below 31/32"

It is reported that the bulk of the commercial production is in the NA 1 or first grade. NA 1 A and NA 1 B appear to be the most commonly quoted qualities. The bulk of the crop, especially in the northern zone, is in the B and C staple length categories. Only a small proportion, mainly in the northeast, falls into the A+ and A groups.

Tests on 16 samples of Nigerian cotton indicated fiber lengths ranging from the equivalent of under 1" staple cotton all the way to nearly 1-1/8". The average was equivalent to 1-1/32" shy. All of the samples had relatively low Micronaires, 3.3 - 3.9, which is quite unusual in cotton this short in staple length, and had high Pressley fiber strengths, above 90,000 pounds per square inch. Comparing Nigerian cotton with low Micronaire 1" Texas cotton, the Nigerian cotton produced cotton yarn of about the same strength but with fewer imperfections and less picker and card waste.

Table 65.—Minimum and maximum fiber and spinning test results on samples of specified Nigerian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained						U.S. reference quality
	NA 1 A (1-1/32"- to 1-1/16") (Kuru) 2 samples from Nigeria	NA 1 A (1-1/32"- to 1-1/16") 2 samples from an import market	NA 1 B 1" to 1-1/32" (Zaria) 4 samples from Nigeria	NA 1 B 1" to 1-1/32" 4 samples from an import market	NA 1 C 31/32"- to 1" (Matum-fashi) 2 samples from Nigeria	NA 1 C 31/32"- to 1" 2 samples from an import market	Texas 1" Under 4.0 micronaire All 125 samples
Fiber test results:							
Fiber length:							
2.5 percent span . . . . . inches	1.10-1.11	1.00-.98	.99-1.06	.99-1.02	1.05-1.07	1.00-1.03	.99-1.03
Uniformity, 50/2.5 . . . . percent	45-46	-43-	44-45	41-43	41-42	42-43	45-48
Micronaire . . . . . reading	3.6-3.9	3.5-3.7	3.3-3.4	3.3-3.5	3.7-3.9	-3.5-	3.2-3.8
Fiber strength:							
Zero gage . . . . . Mpsi	-91-	92-94	92-93	91-95	96-98	93-94	83-88
1/8 inch gage . . . . . gm/tex	22.0-22.7	20.7-21.5	20.7-21.4	19.7-21.6	21.4-21.6	20.1-20.2	21.6-23.0
Elongation:							
1/8 inch . . . . . percent	4.7-4.9	4.3-4.5	4.2-4.7	4.2-4.4	4.0-4.3	4.1-4.2	5.9-7.2
Nonlint content . . . . . percent	3.8-4.2	-3.7-	3.3-4.2	2.7-3.5	-3.5-	3.5-3.8	2.9-4.5
Color, raw cotton:							
Grayness . . . . . number	2-3	-2-	1-2	-1-	-2-	-1-	2-3
Yellowness . . . . . number	5-6	-6-	-5-	-5-	-5-	-5-	3-4
Composite . . . . . index	95-99	-101-	99-101	103-105	-101-	-103-	95-99
Spinning test results:							
Picker & card waste . . . . . percent	4.7-7.0	-4.6-	4.7-4.9	4.2-5.0	-3.5-	4.7-5.3	5.7-7.5
Carded yarn:							
Strength:							
8s. . . . . pounds	--	-342-	[3] 348-	-[1] 333-	--	--	[2] 332-340
22s. . . . . pounds	114-117	-106-	107-115	103-108	-103-	104-106	100-113
50s. . . . . pounds	38-42	--	36-[3] 41	34-[4] 35	-35-	33-36	37-[5] 39
Elongation:							
8s. . . . . percent	--	-6.3-	-[1] 6.5-	-[4] 6.1-	--	--	[2] 6.5-6.8
22s. . . . . percent	6.0-6.6	-5.8-	6.2-6.4	5.9-6.2	-5.7-	5.8-5.9	6.1-6.3
50s. . . . . percent	4.7-5.2	--	[3] 5.2-5.3	[4] 4.7	-4.4-	4.2-4.5	[5] 4.5-4.9
Appearance:							
8s. . . . . index	--	-130-	-[1] 130-	-[4] 120-	--	--	[2] 120-130
22s. . . . . index	120-130	-130-	120-130	110-120	-120-	110-120	80-120
50s. . . . . index	90-100	--	[3] 80-100	-[4] 90-	-80-	-90-	[5] 70-90
Imperfections:							
8s. . . . . number	--	-1-	-[1] 1-	-[4] 1-	--	--	[2] 42-61
22s. . . . . number	13-15	-1-	1-14	1-9	-9-	9-10	25-65
50s. . . . . number	9-14	--	[3] 11-12	[4] 12-14	-8-	8-12	[5] 24-50
U.S. classer's grade . . . . . percent of samples							
St. Mid. White	--	--	--	25	--	--	--
SLM White	--	--	--	--	--	--	40
LM White	--	--	--	--	--	--	20
SM Light Spotted	50	100	100	75	100	100	--
M Light Spotted	50	--	--	--	--	--	--
SLM Light Spotted	--	--	--	--	--	--	40
U.S. classer's staple length . . . . . percent of samples							
1"	--	100	75	50	--	--	100
1-1/32"	--	--	--	25	--	50	--
1-1/16"	--	--	--	25	100	50	--
1-3/32"	50	--	25	--	--	--	--
1-1/8"	50	--	--	--	--	--	--

[1] One sample. [2] 50 samples. [3] Three samples. [4] Two samples. [5] 75 samples.

Sudan

Cotton production in the Sudan in 1971-72 is estimated to total 1,150,000 bales, slightly more than the 1,002,000 bales in 1970-71. The bulk of the crop is exported: 1,049,000 bales in 1970-71.

Eighty-five percent of the Sudan's cotton crop is grown under irrigation and all is handpicked and roller-ginned. The Sudan is one of the two largest producers of extra-long staple cotton in the world, 835,000 bales in 1970-71, and in addition has a substantial production of medium staples, 143,000 bales.

In 1971 the Lambert variety was replaced as the Sudan's leading variety by Barakat, which is reported to be characterized by higher yields and greater resistance to pests. Barakat is also said to have about the same staple length as Lambert but to have a higher uniformity ratio and to produce somewhat stronger yarn.

In the medium staples the crop is mainly Acala cotton with a reported modal staple length of 1-1/16".

Results of tests on a few samples of Sudanese cotton of the important XG6L and G6 grades are given in the table.

The samples of Lambert cotton spun into combed yarns having about the same appearance index as yarns made of U.S. Pima cotton generally and, like Pima, produced few yarn imperfections. Many of the yarn strengths, particularly for Lamberts, were below those for Pima. Waste content from the samples averaged higher than for U.S. Pima but the higher grades of Lamberts might have done better.

Table 66.—Production of cotton by varieties in the Sudan, 1969-70 and 1970-71

Item	1969-70	1970-71 (estimated)
Long and extra-long staples:	*1,000 bales*	*1,000 bales*
Lambert	766	--
VS	105	106
Barakat	46	710
Experimental	6	19
Total	923	835
Medium staples:		
Acala 4-42 (pump and gravity irrigation)	141	134
Acala 4-42 (flood irrigated)	3	9
Total	144	143
"Short" staples:		
American types	46	24
Other	18	--
Total	64	24
Grand total	1,131	1,002

Compiled from Sudan Report to International Cotton Advisory Committee 1971 Proceedings.

Table 67.–Minimum and maximum fiber and spinning test results on samples of specified Sudanese and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Grade, number of samples, where obtained			U.S. reference quality
	G6L 4 samples from import markets	XG6L 4 samples from import markets	XG3S 2 samples from import markets	Pima All grades All 450 samples
Fiber test results:				
Array length:				
Upper quartile . . . . . inches	1.36-1.44	1.39-1.44	1.53-1.56	1.42-1.56
Coefficient of variation . . percent	31-35	33-36	29-33	28-32
Micronaire . . . . . reading	3.9-4.2	4.0-4.1	4.0-4.4	2.8-4.0
Fiber strength:				
Zero gage . . . . . Mpsi	102-104	96-103	96-102	94-104
1/8 inch gage . . . . . gm/tex	29.3-30.1	31.2-32.0	31.0-33.3	31.5-36.0
Elongation:				
1/8 inch . . . . . percent	6.2-6.7	6.2-6.7	6.4-7.0	5.9-7.6
Nonlint content . . . . . percent	5.4-6.5	3.8-4.8	3.5-4.7	2.1-5.5
Color, raw cotton:				
Grayness . . . . . number	5-6	-5-	4-5	3-5
Yellowness . . . . . number	-7-	-7-	-7-	5-6
Composite . . . . . index	79-82	84-86	82-87	85-93
Spinning test results:				
Picker & card waste . . . . . percent	10.9-12.0	9.9-10.5	9.1-10.9	6.7-10.3
Comber waste . . . . . percent	19.2-22.8	21.0-21.7	18.5-20.7	15.0-20.6
Carded yarn:				
Strength:				
50s. . . . . pounds	56-57	57-59	63-66	69-73
80s. . . . . pounds	-30-	-31-	34-37	36-38
Elongation:				
50s. . . . . percent	5.3-5.6	5.2-5.5	5.8-5.9	6.0-6.7
80s. . . . . percent	4.7-4.8	4.5-4.7	5.0-5.5	4.9-5.7
Appearance:				
50s. . . . . index	-120-	120-130	-110-	110-120
80s. . . . . index	100-130	-120-	-110-	110-120
Imperfections:				
50s. . . . . number	1-3	1-2	3-5	2-6
80s. . . . . number	1-3	1-2	2-4	1-6
U.S. classer's grade . . . . . percent of samples				
Grade 3	--	--	--	61
Grade 4	--	25	100	39
Grade 5	100	75	--	--
U.S. classer's staple length . . . . . percent of samples				
1-3/8"	100	100	--	50
1-7/16"	--	--	100	50

Tanzania

Production of cotton in Tanzania totaled 290,000 bales in 1970-71 and 300,000 bales (prelim.) in 1971-72, well below the peak of 365,000 bales achieved in 1966-67. Consumption currently runs around 30,000 bales per year and exports totaled 298,000 bales in 1969-70 and 286,000 bales in 1970-71.

All of Tanzania's cotton is rain-grown, handpicked, and roller-ginned. The ginning period is approximately June-December. In 1969-70, production in western Tanzania, largely near Lake Victoria, totaled 320,000 bales while production in the coastal region totaled only about 8,000 bales.

Present commercial strains in use in Tanzania have been developed over the years from American Upland seed brought during the early years of the 20th century, probably with some admixture with seed of the *barbadense* type. In the central and southern zones of the Lake region, the UK 64 variety is replacing UK 61 and there is also a limited production of "High Maturity" variety cotton. These varieties are reported to have an average staple length of 1-1/16", a staple length range of 1-1/16" to 1-1/8", and a Micronaire ranging from 3.8 to 4.4.

In the relatively small production in the coastal region, IL 62 is replacing IL 58 and IL 66 is being multiplied for future replacement of IL 62. These varieties are a little longer in staple length and slightly finer fibered than Lake region cotton, with a staple length range of 1-1/16" to 1-5/32" an average staple length of 1-3/32" and a Micronaire range of 3.5 to 4.0.

Technical assistance on cotton development is provided by the Cotton Research Corporation, London.

Practically all of Tanzania's cotton is purchased in seed cotton form by local co-ops at a price set by the government. Ginning is also largely done by the co-ops. The Lint and Seed Marketing Board is responsible for buying the crop and selling it in world markets as well as to domestic mills.

Cotton is separated into two grades. AR lint is mature white cotton which is free from stain, extraneous matter, or damage from any cause. BR grade is merchantable cotton inferior to grade AR. An analysis of Tanzania's cotton production by grades, and the AR grade by staple lengths, indicates the bulk of the cotton is AR grade and 1-1/16" in staple length. Cotton from the Lake region or western Tanzania is known in world markets as "Mwanza" after one of the areas in the region.

Results of tests on a limited number of samples of Tanzania cotton showed considerable uniformity in Micronaire, 3.6 - 3.9, but a wide range in Pressley strength, 77,000 to 95,000 pounds per square inch. Samples had fiber lengths averaging the equivalent of between 1-1/16" and 1-3/32" in staple length. The samples produced 50s yarn that was stronger than yarn from Mississippi SLM White 1-3/32" and Arizona DPL White 1-1/16" but not as strong as yarn from Acala SJ-1. Waste was higher and yarn imperfections averaged lower.

Table 68.—Cotton production in Tanzania by grade and staple length, 1967-69

Year	Total	BR	AR	AR grade by staple lengths					
				Total	1-1/32"	1-1/16"	1-3/32"	1-1/8"	1-5/32"
	1,000 bales[1]	*1,000 bales*[1]	*1,000 bales*[1]	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
1967	390	37	353	100	8	83	8	1	-
1968	283	40	243	100	-	86	11	3	-
1969	393	59	334	100	5	85	7	2	1

Compiled from Tanzania report, International Cotton Advisory Committee Proceedings 1970 p. 320.

[1] Bales of 400 pounds net.

Table 69.–Minimum and maximum fiber and spinning test results on samples of specified Tanzanian and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Description, number of samples, where obtained			U.S. reference qualities		
	AR Mwanza 1-1/16" 5 samples from import markets	AR Mwanza Type Olive 4 small samples from an import market	AR Mwanza Type Ninna 2 small samples from an import market	Miss. SLM White 1-3/32" All 350 samples	Arizona DPL M While 1-1/16" All 200 samples	California Acala SJ1 1-3/32" All 175 samples
Fiber test results:						
Fiber length:						
2.5 percent span . . . . . inches	1.06-1.10	1.05-1.08	-1.11-	1.07-1.14	1.08-1.12	1.07-1.13
Uniformity, 50/2.5 . . . . percent	44-46	44-46	-45-	41-46	40-45	45-47
Micronaire . . . . . reading	3.6-3.8	3.6-3.8	-3.9-	3.9-4.9	3.5-5.0	3.9-4.4
Fiber strength:						
Zero gage . . . . . Mpsi	77-89	80-85	93-95	78-87	81-87	92-101
1/8 inch gage . . . . . gm/tex	19.9-23.6	19.7-21.4	22.1-22.5	22.1-24.8	21.9-24.1	24.0-27.2
Elongation:						
1/8 inch . . . . . percent	5.5-5.7	5.7-5.9	-5.4-	5.4-7.0	6.3-7.4	4.9-5.7
Nonlint content . . . . . percent	2.9-3.6	2.7-4.8	3.2-3.5	2.6-3.8	2.0-3.2	1.6-2.7
Color, raw cotton:						
Grayness . . . . . number	1-2	1-2	-2-	1-3	1-2	1-2
Yellowness . . . . . number	4-5	4-6	-3-	1-3	2-3	-3-
Composite . . . . . index	100-104	100-105	98-99	95-102	101-103	101-103
Spinning test results:						
Picker & card waste . . . . . percent	4.9-9.9	(1)	(1)	5.5-7.1	5.0-6.4	3.9-5.8
Carded yarn:						
Strength:						
22s. . . . . pounds	108-120	(1)	(1)	102-112	98-110	119-129
50s. . . . . pounds	39-42	(1)	(1)	32-41	31-39	42-48
Elongation:						
22s. . . . . percent	6.7-6.8	(1)	(1)	6.3-7.7	5.5-6.6	5.0-5.6
50s. . . . . percent	5.2-5.7	(1)	(1)	4.8-6.0	3.7-4.7	3.6-4.4
Appearance:						
22s. . . . . index	100-130	(1)	(1)	90-110	100-130	110-120
50s. . . . . index	90-100	(1)	(1)	70-90	80-90	80-100
Imperfections:						
22s. . . . . number	7-19	(1)	(1)	11-24	14-23	16-32
50s. . . . . number	6-17	(1)	(1)	9-24	10-21	12-22
U.S. classer's grade . . . . . percent of samples						
Strict Mid. Lt. Spot	40	--	--			
Mid. Lt. Spot.	60	--	--	(See title)	(See title)	(See title)
U.S. classer's staple length . . . . . percent of samples						
1-3/32"	40	--	--	(See title)	(See title)	(See title)
1-1/8"	60	--	--			

[1] Samples too small to permit spinning tests.

Uganda

Production of cotton in Uganda totaled 381,000 bales in 1969-70 and 337,000 bales in 1970-71. Consumption totaled 60,000 bales in 1970-71 and exports 337,000 bales in 1969-70 and 313,000 bales in 1970-71.

Nearly all of Uganda's cotton is rain-grown, and all is handpicked and roller-ginned. The government in 1971, however, was planning to install a saw-gin in the hope of relieving congestion at some gins. The crop is harvested from December into April.

A new variety SATU has replaced S-47 in northern Uganda where one-third to one-half of Uganda's cotton is grown. Elsewhere BPA has replaced BP-52. Both are selections from Albar 51, obtained from an importation of Nigerian Allen cotton that was selected for resistance to bacterial blight disease. SATU is much coarser than its predecessor and has a staple length of 1-1/16" to 1-1/8" and a Micronaire of 3.6 to 4.8. BPA is marginally longer and stronger and is considerably coarser than its predecessor with a Micronaire of 3.3 to 4.5 and a staple length of 1-1/8" to 1-7/32". It is reported that the new varieties should be more suitable for spinning on high-speed machinery and should react better in dyeing, bleaching, and crease-resisting processes. Average Pressley strength for SATU is stated to be 86,000 pounds per square inch and for BPA, 90,000 pounds.

In 1964 the Government of Uganda decided that the entire buying and processing of the country's cotton crop should be in the hands of the grower co-ops. The latter acquired a large number of privately owned gins from 1964 to 1968 and now probably all are co-op owned. The co-ops in turn sell their cotton to the Lint Marketing Board which in turn sells to licensed exporters or directly overseas. In 1970-71 it was decided that the board should engage more and more in direct shipping to overseas buyers. Accordingly 20 percent of the total outturn in 1970-71 was to be shipped directly, rising to presumably 100 percent by 1973-74. To facilitate the new operation the board has distributed selling types as a basis for shipments. For the balance of the crop that is sold to locally based exporters in auctions or by private contracts, "selling standards" are still used.

Uganda cotton is carefully sorted to remove leaf trash and then divided into two grades AR and BR. AR is described as "first quality unstained cotton" and BR as "second quality stained lint" including "stripper damaged cotton and any other damaged lint." Production of AR and BR qualities in 1968-69 through 1970-71 was as follows:

	1968-69	1969-70	1970-71
	1,000 bales of 480 lbs. net		
AR	308	343	300
BR	38	38	37
Total	346	381	337

In auctions of the Lint Marketing Board, AR cotton is sold in lots of 250 bales in consecutive runs from a single gin with the variety and gin specified. A price quotation on May 17, 1972, was for "BPA seed, Bunyoro 535.00 Uganda cents," etc.

A grade of Ugandan cotton known as the selling standard may also form the basis of sales between the Lint Marketing Board and buyers. The selling standard is described as being equivalent to U.S. Middling. There are several other grades superior and inferior to the selling standard. For cotton in these grades, prices

are differentiated according to allowances established by a "differences committee." Production by grades in 1969-70 and 1970-71 was as follows:

	1969-70	1970-71
	Percent	*Percent*
Selling standard plus 1	12	27
Selling standard	28	32
1/4 to 1/2 off selling standard	48	37
3/4 to 1 off selling standard	7	3
1-1/4 to 1-1/2 off selling standard	4	1
1-3/4 to 2 off selling standard	1	--
Total	100	100

Results of tests on 16 samples of Uganda cotton show the BPA samples had fiber lengths equivalent to 1-3/32" to nearly 1-1/4", with Micronaires of 3.6 - 3.8 while the SATU varieties ranged all the way from the equivalent of 1-1/16" to 1-3/16" with Micronaires of 2.9 to 4.2. Results are compared with results from U.S. Acala cotton.

Table 70.–Production of cotton in Uganda, 1968-71

Zones and regions	1968-69	1969-70	1970-71
Buganda:	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]
Mengo	24	--	--
Masaka	2	--	--
Mubende	10	--	--
Total	36	37	38
Western			
Bunyoro	17	--	--
Kazinga Channel	9	--	--
Total	26	32	28
Eastern:			
Busoga	52	--	--
Mbale	47	--	--
Teso	38	--	--
Teso Segregated	6	--	--
Usuku	3	--	--
Total	146	182	175
Northern:			
Lango	60	--	--
East Acholi	17	--	--
West Acholi	18	--	--
West Nile	40	--	--
Total	135	130	96
Grand total	343	381	337

[1] 480 lb. net.

Table 71.–Minimum and maximum fiber and spinning test results on samples of specified Ugandan and U.S. cottons, and U.S. classer's grade and staple descriptions

Item	Description, number of samples, where obtained							U.S. reference qualities	
	BP 52 3 samples from Uganda	AR BP 52 1 sample from an import market	BPA 2 samples from Uganda[1]	AR BPA 2 samples from an import market	SATU 4 samples from Uganda[2]	AR SATU 2 samples from an import market	BR SATU 2 samples from Uganda[3]	Calif Acala SJ1 SLM White 1 1/8" All 200 samples	Acala 1517 Mid. White All 175 samples
Fiber test results:									
Fiber length:									
2.5 percent span . . . . . inches	1.13-1.19	1.10	-1.21-	1.11-1.12	1.13-1.18	1.15-1.16	1.07-1.08	1.10-1.14	1.15-1.21
Uniformity, 50/2.5 . . . . . percent	45-46	-45-	45-47	44-46	44-46	45-46	-43-	44-47	44-46
Micronaire . . . . . reading	3.6-3.7	3.4	3.7-3.8	3.6-3.7	3.9-4.1	-4.2-	2.9-3.5	3.8-4.3	3.7-4.1
Fiber strength:									
Zero gage . . . . . Mpsi	85-88	81	84-86	87-90	89-94	88-90	87-90	95-100	90-98
1/8 inch gage . . . . . gm/tex	23.9-24.8	22.9	23.7-24.2	21.7-22.6	21.3-22.7	22.5-23.5	21.9-22.5	24.9-26.6	26.1-27.9
Elongation:									
1/8 inch . . . . . percent	6.0-6.6	6.4	6.7-7.1	-6.1-	5.3-5.8	5.1-5.6	5.0-5.7	4.8-5.7	4.8-5.7
Nonlint content . . . . . percent	1.9-2.2	4.5	1.5-1.6	2.3-2.6	2.1-2.4	3.0-3.1	7.5-9.9	3.1-3.5	1.9-3.8
Color, raw cotton:									
Grayness . . . . . number	0-1	1	-1-	-1-	1-2	-1-	-5-	1-2	0-1
Yellowness . . . . . number	-4-	5	3-4	-3-	-4-	-4-	5-6	-3-	2-3
Composite . . . . . index	103-105	104	101-104	-103-	101-103	102-103	-82-	96-101	103-106
Spinning test results:									
Picker & card waste . . . . . percent	7.4-8.7	7.9	7.3-7.7	([4])	5.4-8.8	9.1-9.5	11.3-12.1	4.6-6.4	6.7-8.0
Carded yarn:									
Strength:									
22s . . . . . pounds	129-132	130	131-134	([4])	109-120	121-122	104-109	127-132	129-145
50s . . . . . pounds	45-48	46	48-50	([4])	37-42	40-41	35-39	48-50	48-55
Elongation:									
22s . . . . . percent	6.8-7.1	7.6	7.1-7.6	([4])	5.7-6.3	-6.7-	6.0-6.4	5.4-5.8	6.4-7.3
50s . . . . . percent	5.7-5.8	6.0	5.8-5.9	([4])	4.6-5.0	-5.1-	4.5-4.8	4.2-4.6	5.3-5.9
Appearance:									
22s. . . . . index	110-120	120	-120-	([4])	120-130	-130-	-80-	110-120	90-110
50s. . . . . index	100-110	100	-100-	([4])	100-110	-110-	60-70	80-100	70-90
Imperfections:									
22s. . . . . number	6-13	13	9-14	([4])	6-12	4-5	33-43	14-28	12-29
50s. . . . . number	7-11	12	9-10	([4])	4-11	6-7	32-39	9-20	10-23
U.S. classer's grade . . . . . percent of samples									
Strict Mid. Lt. Spot	67	100	--	--	--	100	--	(See	(See
Mid. Lt. Spot.	33	--	100	--	100	--	--	title)	title)
Low Mid. Spotted	--	--	--	--	--	--	50		
Strict Low Mid. Tinged	--	--	--	--	--	--	50		
U.S. classer's staple length . . . . . percent of samples									
1-1/16"	--	--	--	--	--	--	100	(See	--
1-3/32"	--	--	--	--	25	--	--	title)	--
1-1/8"	33	100	--	--	--	50	--	--	--
1-5/32"	67	--	50	--	50	50	--	--	86
1-3/16"	--	--	50	--	25	--	--		14

[1] Each made up of 12 subsamples; a subsample does not meet sample requirements indicated elsewhere in this report, yet is believed to be reliably representative. [2] Representing 36 subsamples. [3] One sample includes six subsamples. [4] All samples too small for spinning tests.

APPENDIX

Explanation of tests [5]

The following explanation of the data published in this report may be helpful in the interpretation of test results:

Classification

Classification was made in accordance with the official Cotton Standards for grade and staple length. These results are presented under the usual terms for the individual lots. The *grade* of cotton is obtained by evaluating color, leaf, and preparation in relation to the official standards. Grade provides an indication of fiber color and the waste content of a sample of cotton. Experience has shown the average relationship between picker and card waste and various grades of upland cotton to be approximately as given in the tabulation shown in the subsequent section on manufacturing waste. In comparing these average grade figures with the picker and card waste data, it should be understood that variations from the averages for individual samples are attributable to the nature of the extraneous material present in the cotton, the characteristics of the fiber, and whether the grade designation was low because of poor color.

Staple length is the length of a typical portion of the fibers in the samples as determined by the classer in comparison with official standards. Uniformity of fiber length, as well as other fiber properties, influence to some extent the classer's selection of the typical portion of the fibers on which the staple length designation is based. In general, there is a fairly close relationship between the staple length as designated by the classer and the fineness and strength of the yarn that can be manufactured from the cotton. These relationships, however, are also influenced by other fiber properties, the measurements of which will be discussed in the paragraphs which follow.

Fiber tests

Fiber length data were obtained by the Digital Fibrograph method for the short, medium, and long staple samples and by the array method for the extra long samples. Briefly, the Digital Fibrograph method consists of placing representative specimens of cotton weighing approximately 30 centigrams at random on a pair of combs, parallelizing the beards of cotton extending from one side of the combs, and scanning these beards photoelectrically on the instrument at 3-length intervals beginning at 0.15 inch from the teeth of the combs and ending near the outer fringe. The 2.5-percent span length and the 50/2.5 uniformity ratio values reported for each lot are based on five specimens tested by each of two technicians.

The Digital Fibrograph 2.5-percent span length values reported indicate the length which will be spanned by 2.5 percent of the fibers when they are parallel and randomly distributed. It is also the length where the amount of fibers indicated by the instrument is 2.5 percent of the amount at the starting point of 0.15 inch. The Digital Fibrograph 2.5-percent span length values are closely related to staple length designations.

The Digital Fibrograph 50/2.5 uniformity ratio values reported indicate the relative uniformity of fiber length in the samples. They represent the ratios between the 50-percent span length and the 2.5-percent span length, expressed as percentages. Larger values indicate more uniform fiber length distribution. Unusually low fiber length uniformity tends to increase manufacturing waste, to make processing more

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[5] "Summary of Cotton Fiber and Processing Test Results, Crop of 1971," pp. 111-126, Cotton Division, Consumer and Marketing Service, U.S. Department of Agriculture, April 1972.

difficult, and to lower the quality of the product. The following adjective descriptions will serve to classify cottons from the standpoint of 2.5-percent span length and fiber length uniformity:

2.5-percent span length		50/2.5 uniformity ratio	
Below 1.00	Short	Below 42	Very low
1.00 - 1.14	Medium	42 - 43	Low
1.15 - 1.29	Long	44 - 45	Average
Above 1.29	Extra-long	46 - 47	High
		Above 47	Very high

Data source - 1575 American upland lots tested from the crops of 1966-68.

Array tests for the extra long staple and upland samples were performed on the Suter-Webb fiber sorter. Briefly, this method consists of parallelizing the fibers in a representative 75-milligram specimen of cotton through a series of combs, separating the fibers into length groups at 1/8-inch intervals, and weighing the fibers in each length group. The upper quartile length and coefficient of variation values reported are based on one specimen tested by each of two technicians.

The array upper quartile length values indicate the length which is exceeded by 25 percent of the weight of the fibers in the samples. They are closely related to and longer than both the Fibrograph and the classer's staple designations. This relationship may vary, however, because the methods measure different fiber length characteristics.

The array coefficient of length variation values indicate the relative variability of fiber length in the samples. They represent the standard deviation of the weight-length frequencies expressed as a percentage of the mean length. Smaller values indicate more uniform fiber length distributions. Excessive fiber length variation tends to increase manufacturing waste, to make processing more difficult, and to lower the quality of the product. It is, therefore, considered desirable for a cotton to have a low coefficient of variation. The following adjective descriptions will serve to classify cottons from the standpoint of upper quartile length and fiber length variation:

Upper Quartile Length		Coefficient of Fiber Length Variation	
Below 1.10	Short	Below 26	Very low variation
1.10 - 1.24	Medium	26 - 29	Low variation
1.25 - 1.39	Long	30 - 33	Average variation
Above 1.39	Extra Long	34 - 37	High variation
		Above 37	Very high variation

Data source - 830 American upland lots tested from the crops of 1958-60 (more recent data not available).

Fiber fineness and maturity in combination were determined by the Micronaire test. This is an instrument test which measures the resistance of a plug of cotton to air flow. A representative standard weight of cotton fibers is placed in the instrument specimen holder and compressed to a fixed volume. Air at a known pressure is forced through the specimen and the amount of flow is indicated by a direct reading scale. Readings obtained are relative measures of either the weight per unit length, or the cross-sectional size of the fibers. Because the instrument measures may differ from the actual weight per inch, depending upon the fiber characteristics of the sample, the results are reported in terms of "Micronaire reading" instead of micrograms per inch. These readings are taken from the curvi-linear scale adopted in 1950, and now in international use. Fiber fineness contributes to yarn strength, particularly when fine numbers are spun, but it also tends to increase neppiness and to require a reduced rate of processing.

Fiber strength tests for fiber strength were made without a space between the clamp jaws (O gage) using the Pressley flat bundle tester, and with a 1/8-inch spacer between the clamp jaws (1/8-inch gage) using the Stelometer. Comparative tests have shown that the results of the 1/8-inch gage tests are more highly correlated with yarn strength than the results of the zero gage tests. Results for both methods are reported, however, because the zero gage tests are widely used by the cotton industry.

The results for the Pressley zero gage test are reported in terms of thousand pounds per square inch, as calculated by the use of Formula 1. These results may be converted to other methods of expressing fiber strength by use of Formulas 2, 3, and 4:

(1) Thousand pounds per square inch (Mpsi) =

$$\frac{\text{breaking load in lb} \times 10.81}{\text{bundle weight in mg}}$$

(2) Grams per tex (gm/tex) = Mpsi x 0.496

(3) Strength-weight ratio = Mpsi ÷ 10.81

(4) Strength-weight ratio = gm/tex ÷ 5.36

The results of the 1/8-inch gage tests are reported in terms of grams per tex in accordance with the recommendations of the American Society for Testing and Materials (ASTM), and the International Standards Organization (ISO). A tex unit is equal to the weight in grams of 1,000 meters of the material. There is a correlation between the 1/8-inch gage strength test results and fiber length. Cottons with short lengths tend to have lower average strength values than long staple cottons. Results for 1/8-inch gage tests are calculated by use of Formula 5. Stelometer results are adjusted to Pressley level by use of calibration cottons.

(5) Grams per tex = $\frac{\text{breaking load (kg)} \times 15}{\text{bundle weight in mg}}$

The following descriptive terms may be applied to the data shown in this report:

Staple length group and descriptive designation	Zero gage strength	1/8-inch gage strength
Short staple:	*1,000 psi*	*Grams per tex*
Low	70 - 75	18 - 19
Average	76 - 81	20 - 21
High	82 - 87	22 - 23
Medium staple:		
Low	74 - 80	20 - 21
Average	81 - 87	22 - 23
High	88 - 94	24 - 25
Long staple:		
Low	85 - 88	23 - 24
Average	89 - 92	25 - 26
High	93 - 96	27 - 28
Extra-long staple:		
Low	93 - 96	31 - 32
Average	97 - 100	33 - 34
High	101 - 104	35 - 36

Data source - 291 short staple, 1206 medium staple, 78 long staple, and 67 extra-long staple lots of cotton tested from the crops of 1966-68.

Fiber elongation results were obtained in connection with the 1/8-inch gage fiber strength tests by using the Stelometer instrument. The following adjective ratings will assist in the interpretation of the fiber elongation results reported:

Descriptive designation	Fiber elongation
	Percent
Very low	5.3 and below
Low	5.4 - 6.2
Average	6.3 - 7.1
High	7.2 - 8.0
Very high	8.1 and above

Data source - 1575 American upland lots tested from the crops of 1966-68.

Color measurements were made on samples of raw stock from each lot by using the Nickerson-Hunter Colorimeter. The basic color values reported are in terms of grayness and yellowness scales designed especially for cotton. The grayness scale ranges from 0 for the brightest samples (no gray) through 9 for the darkest color. The yellowness scale ranges from 0 for the lightest color (no yellow) to 9 for the yellowest color. In other words, the larger the number reported the darker or yellower the cotton becomes.

Nonlint content for the various lots was determined by the use of the Shirley Analyzer which separates the lint from the foreign matter. The total nonlint values reported include both visible and invisible loss. These results are distinguished from total picker and card waste in that practically no fiber is included, whereas textile mill wastes include appreciable amounts of fiber. Tests performed in previous years show the following average relationship of Shirley Analyzer nonlint to grade:

American upland grade	Average nonlint content
	Percent
Strict Middling	1.8
Middling	2.3
Strict Low Middling	3.0
Low Middling	4.2
Strict Good Ordinary	5.5
Good Ordinary	6.7

Data source - 5561 American upland lots tested from crops of 1966-68.

The following scale has been developed to represent the average nonlint content for grades of American Pima cotton:

American Pima grade	Average nonlint content
	Percent
1	2.0
2	2.5
3	3.0
4	4.1
5	5.4
6	6.3
7	8.4
8	9.9
9	12.2

Data source - 431 American Pima lots tested from the crops of 1966-68.

Differences between results obtained for individual lnts and the average percentages shown for the grades may be caused by: (1) Grade is a combination of color, leaf and preparation; any one of which may be the limiting factor, (2) there is a range of trash allowable within each specific grade and (3) these data are based on weight and do not take into consideration the nature of the trash, which may be as important as weight in determining the final grade.

Yarn processing tests

The results of yarn processing tests were obtained by procedures adopted in 1962 which include heavier weights for laps, slivers and rovings than those used in previous years. These procedures also include spinning from single roving instead of double rnving for the two standard yarn numbers and the spinning of a third yarn number on all the samples to provide a small-scale measure of spinning end-breakage or spinning performance. In 1965, metallic card clothing was installed on the carding machines to replace the conventional fillet clothing used previously, and in 1966, crusher rolls were installed on the card machines. These changes reflect similar changes that have taken place in the cotton textile industry including increased emphasis on running quality since the Mid-1940's when long-draft systems were adopted for both the roving and spinning processes in the routine laboratnry spinning test procedures. These changes were designed to bring the laboratory processing procedures more in line with current textile mill practices and thus make the processing evaluations more applicable to present day mill operations.

The card production rate employed and the yarn numbers spun for each cotton were selected on the basis of the staple length expected. Four different length groupings were used to cover the range of cottons grown in this country and to approach commercial practices in processing these cottons. The spinning twist multipliers were selected to provide maximum yarn strength on the basis of staple length. Details of the spinning test procedures are shown at the end of this section of the report. Results of previous tests show that decreasing the card production rate results in fewer neps, improved yarn appearance grades, and removal of more waste at the card. Results of tests on the various lots should therefore be compared directly for only those lots in the same length group which were processed in a comparable manner.

Manufacturing waste reported for a sample of cotton is important because excessive waste increases the cost of cotton products. The percentage of waste extracted by the picking and carding processes in performing a spinning test provides a measure of manufacturing waste. There is an average relationship between this waste and grade as discussed in the previous section on the grade of cotton. The rate at which the cotton is carded, however, affects the picker and card waste values because the more thorough carding action obtained when the carding rate is decreased extracts a larger quantity of waste. The longer staple cottons are generally carded at a lower rate than the shorter cottons in order to obtain acceptable yarn quality. Tests performed in recent years show the following average relationship of picker and card waste to grade:

American upland grade	Average picker and card waste	American Pima	Average picker and card waste
	Percent		*Percent*
Strict Middling	4.7	1	7.5
Middling	5.1	2	7.9
Strict Low Middling	5.7	3	8.4
Low Middling	6.7	4	9.5
Strict Good Ordinary	7.8	5	10.8
Good Ordinary	8.9	6	11.7
		7	13.7
		8	15.2
		9	17.5

Data source - 5561 samples of American upland cotton and 431 samples of American Pima cotton tested for Shirley Analyzer nonlint content from the crops of 1966-68 and picker and card waste calculated from its relationship to Shirley Analyzer nonlint content.

The percentage of waste removed by the comber is reported in addition to the picker and card waste for cottons processed into combed yarn. The shorter staple cottons are processed through the comber with a closer setting than for the longer staple cottons because smaller comber waste percentages are usually extracted from this cotton in commercial practice.

Yarn strength is perhaps the most important and reliable test of yarn quality. Yarn strength not only determines the range of usefulness of a given cotton, but is also an indication of spinning and weaving performance. Yarn strength is reported in terms of skein strength since studies have shown that such strength values are more closely related to fabric strength as well as to fiber properties than single strand yarn strength. Skein strength data for the two numbers spun are reported for each lot. There is an average relationship between yarn strength and staple length but it varies for the individual cottons because of differences in other characteristics of the fiber.

The following descriptive terms may be of help in determining the relative level of yarn strength:

Kind of yarn, staple length group and description	Yarn skein strength in pounds for the specified yarn numbers	
Carded yarns:	*Pounds*	*Pounds*
Short staple group:	*8s*	*22s*
Low	265 - 290	78 - 86
Average	291 - 316	87 - 95
High	317 - 342	96 - 104
Medium staple group:	*22s*	*50s*
Low	95 - 104	30 - 35
Average	105 - 114	36 - 41
High	115 - 125	42 - 47
Long staple group:	*22s*	*50s*
Low	125 - 131	45 - 48
Average	132 - 138	49 - 52
High	139 - 145	53 - 56
Combed yarns:	*22s*	*50s*
Long staple group:		
Low	142 - 149	52 - 55
Average	150 - 157	56 - 59
High	158 - 165	60 - 63
Extra-long staple group:	*50s*	*80s*
Low	66 - 68	36 - 37
Average	69 - 71	38 - 39
High	72 - 74	40 - 41

Data source - 291 short staple, 1206 medium staple, 78 long staple and 67 extra-long staple lots of cotton tested from the crops of 1966-68.

Yarn elongation results were obtained in connection with yarn skein strength tests. Elongation in the yarn is highly correlated with fiber elongation. Yarns with high elongation give less end breakage in weaving than yarns with low elongation.

The following descriptive terms may be of some help in determining the relative levels of yarn elongation:

Kind of yarn, staple length group, and description	Yarn elongation in percent for the specified yarn numbers	
Carded yarns:	*Percent*	*Percent*
Short staple group:	*8s*	*22s*
Low	6.5 - 7.3	5.5 - 6.2
Average	7.4 - 8.1	6.3 - 7.0
High	8.2 - 9.0	7.1 - 7.8
Medium staple group:	*22s*	*50s*
Low	5.4 - 5.9	4.0 - 4.5
Average	6.0 - 6.5	4.6 - 5.1
High	6.6 - 7.1	5.2 - 5.7
Long staple group:	*22s*	*50s*
Low	6.2 - 6.5	5.2 - 5.4
Average	6.6 - 6.9	5.5 - 5.7
High	7.0 - 7.3	5.8 - 6.0
Combed yarns:	*22s*	*50s*
Long staple group:		
Low	6.6 - 6.9	5.5 - 5.7
Average	7.0 - 7.3	5.8 - 6.0
High	7.4 - 7.7	6.1 - 6.3
Extra-long staple group:	*50s*	*80s*
Low	5.6 - 5.8	4.6 - 4.8
Average	5.9 - 6.1	4.9 - 5.1
High	6.2 - 6.4	5.2 - 5.4

Data source - 291 short staple, 1206 medium staple, 78 long staple and 67 extra-long staple lots of cotton tested from the crops of 1966-68.

Yarn Appearance refers to the relative evenness, smoothness and freedom from foreign material of the yarn as evaluated by a visual comparison of the yarn with the latest standards adopted by the American Society for Testing and Materials. Since appearance is very important in many types of cotton products, high yarn appearance grades are desirable. The following descriptive terms may be of help in determining the relative levels of yarn appearance in this report:

Kind of yarn, staple length group, and description	Yarn appearance index for the specified yarn numbers	
Carded yarns:		
Short staple group:	*8s*	*22s*
Low	105 - 113	92 - 104
Average	114 - 122	105 - 117
High	123 - 130	118 - 130

Kind of yarn, staple length group, and description	Yarn appearance index for the specified yarn numbers	
Medium staple group:	*22s*	*50s*
Low	93 - 105	77 - 87
Average	106 - 118	88 - 98
High	119 - 130	99 - 109
Long staple group:	*22s*	*50s*
Low	71 - 86	65 - 78
Average	87 - 102	79 - 92
High	103 - 118	93 - 106
Combed yarns:		
Long staple group:	*22s*	*50s*
Low	81 - 97	70 - 85
Average	98 - 114	86 - 101
High	115 - 130	102 - 117
Extra-long staple group:	*50s*	*80s*
Low	102 - 111	98 - 106
Average	112 - 121	107 - 115
High	122 - 130	116 - 124

Data source - 291 short staple, 1206 medium staple, 78 long staple and 67 extra-long staple lots of cotton tested from the crops of 1966-68.

Yarn Appearance Grades

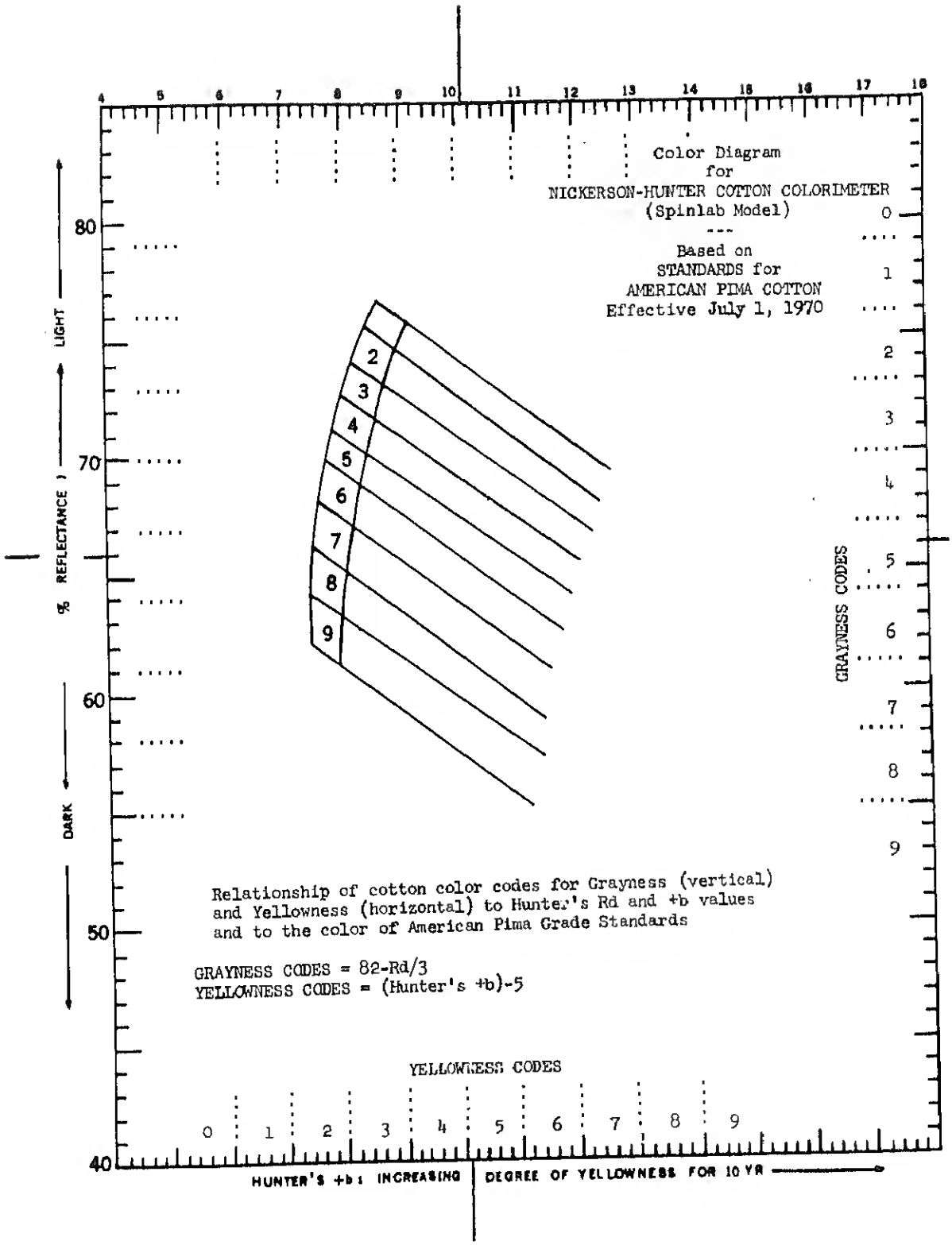
Grade	*Index*
A	130
B+	120
B	110
C+	100
C	90
D+	80
D	70
Below D	60

Yarn imperfections are reported for the two yarn numbers spun for each lot of cotton. These results were obtained on "Neptel" instruments which electronically count the abrupt changes in the silhouette of the yarn while passing it through a beam of light. They are expressed as the number of imperfections per 50 yards of yarn and are based on the average of 10 determinations. This value is an instrument measure of product quality which is associated with the characteristics of the cotton. It is more highly correlated with

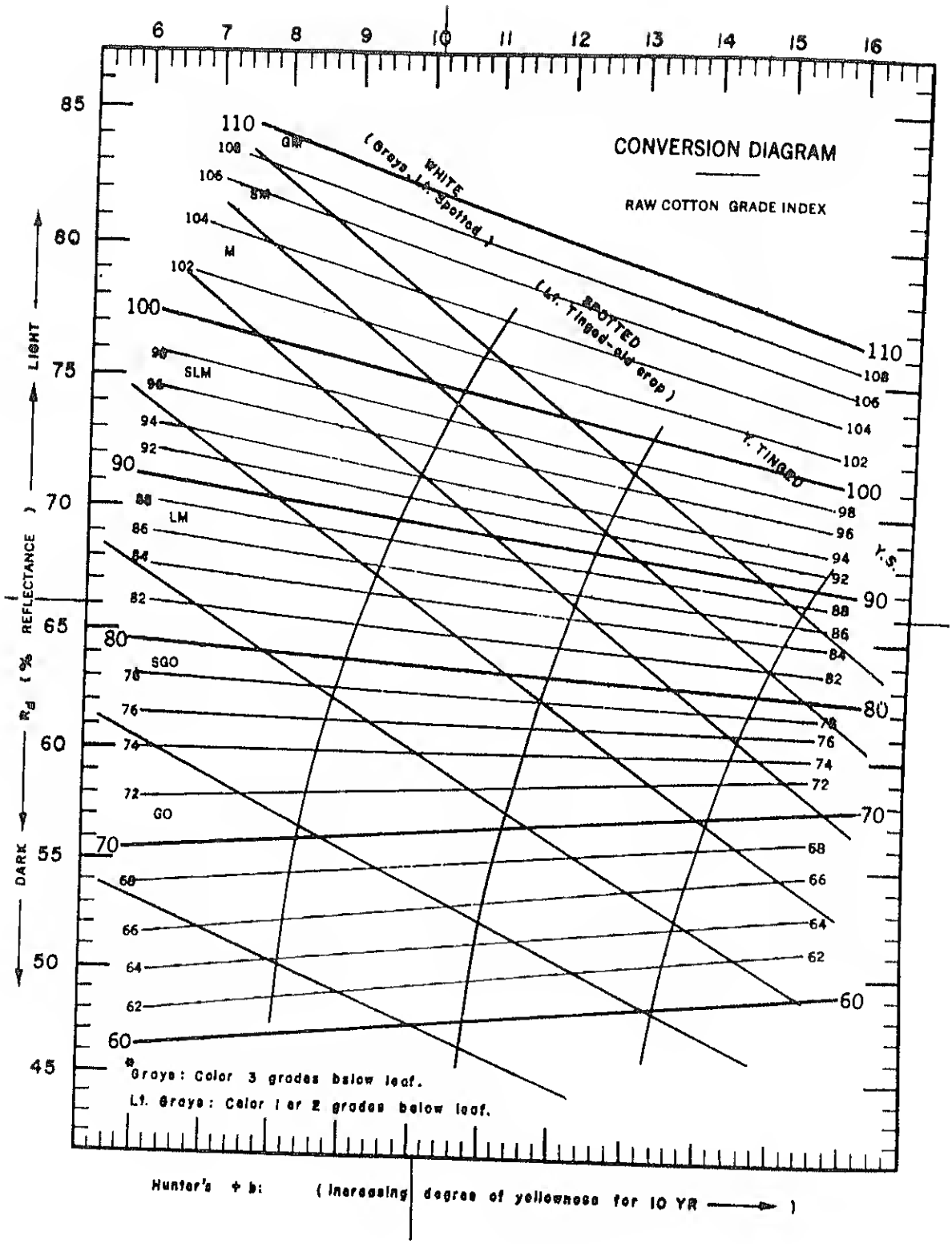
fiber properties than either neps in card web or yarn appearance grade. The following descriptive terms may be of help in determining the relative level of yarn imperfections in this report:

Kind of yarn, staple length group, and description	Yarn imperfections for the specified yarn numbers	
Carded yarns:		
Short staple group:	*8s*	*22s*
Low	6 - 31	6 - 21
Average	32 - 57	22 - 37
High	58 - 83	38 - 53
Medium staple group:	*22s*	*50s*
Low	3 - 15	2 - 11
Average	16 - 28	12 - 21
High	29 - 41	22 - 31
Long staple group:	*22s*	*50s*
Low	7 - 22	6 - 17
Average	23 - 38	18 - 29
High	39 - 54	30 - 41
Combed yarns:		
Long staple group:	*22s*	*50s*
Low	0 - 8	0 - 6
Average	9 - 20	7 - 16
High	21 - 32	17 - 26
Extra-long staple group:	*50s*	*80s*
Low	0 - 1	0 - 1
Average	2 - 3	2 - 3
High	4 - 5	4 - 5

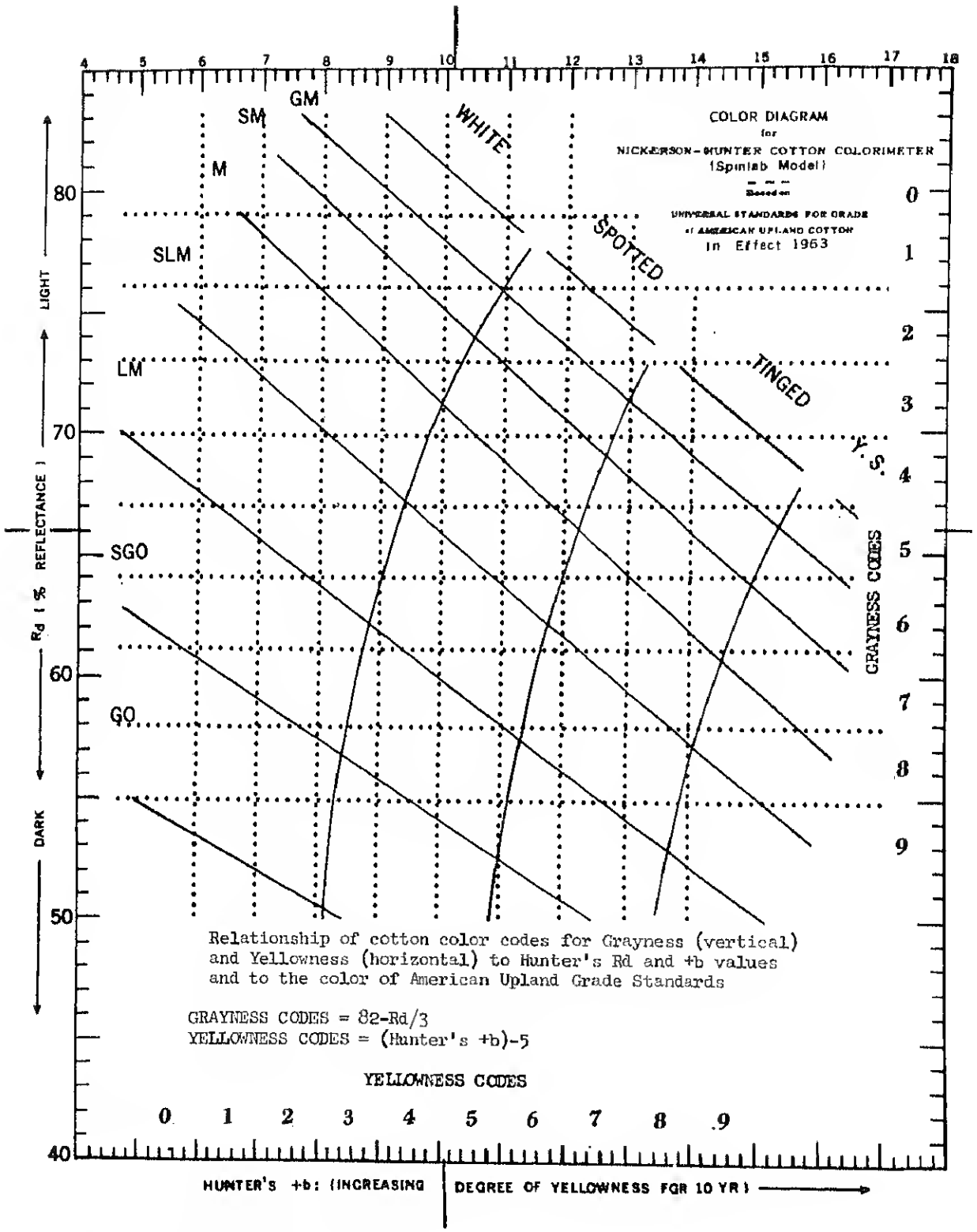
Data source - 291 short staple, 1206 medium staple, 78 long staple and 67 extra-long staple lots of cotton tested from the crops of 1966-68.



Colorimeter diagram for American Pima cotton.



Conversion diagram for converting raw cotton color to color index.



Colorimeter diagram for Upland cotton.